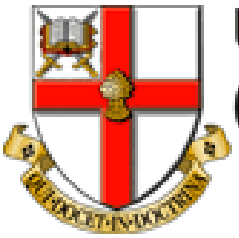

University of Chester

Department of Clinical Sciences and Nutrition

MSc Obesity & Weight Management

Office cake consumption in the UK: an exploration of its characteristics and associated attitudes among office workers

Name: Louise Walker

Student number: 1523909

Assessment number: J25321

Date submitted: 14 August 2017

Wordcount: 8697

Declaration

I hereby confirm that the work submitted for this assessment is my own work and that I correctly acknowledge the work of others. I declare this assignment complies with the word count specified.

Signed: Louise Walker, J25321

14 August 2017

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Lastly, and most importantly, my husband Simon and children Jack and Charlie deserve the most heartfelt gratitude for their stoic support over the last two years. Now it is my turn to support you all.

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List of Abbreviations

Literature review

WL, weight loss; WG, weight gain; PA, physical activity; WHPP, workplace health promotion programme; DN, descriptive norms; DQ, diet quality; BMI, body mass index; WHO, World Health Organisation; RCT, randomised controlled trial; CI, confidence interval; SACN, Scientific Advisory Committee on Nutrition; TEI, total energy intake; EI, energy intake; PBC, perceived behavioural control; TPB, Theory of Planned Behaviour; NHANES, National Health and Nutrition Examination Survey; EO, eating occasions; EF, eating frequency; OR, odds ratio; UPF, ultra-processed food; AS, added sugars; PHE, Public Health England; OCC, office cake culture.

Research project

OC, office cake; WHPP, workplace health promotion programme; EI, energy intake; SSBs, sugar-sweetened beverages; TPB, Theory of Planned Behaviour; PBC, perceived behavioural control; DQ, diet quality.

Department of Clinical Sciences and Nutrition

MSc Obesity & Weight Management

Literature review

Eating behaviour in the workplace and its effects on obesity

Name: Louise Walker

Assessment number: J25321

Student number: 1523909

Date submitted: 14 August 2017

Word count: 4345

Abstract

With global prevalence of obesity and associated non-communicable diseases continuing to rise, the workplace has been identified as an important setting for improving healthy lifestyle choices including weight loss (WL), weight gain (WG) prevention and physical activity (PA) increase. The workplace health promotion programme (WHPP) literature is prolific but heterogeneous making conclusions hard to synthesise. Evidence suggests multicomponent and environmental interventions are most effective although effect sizes are small and implementation barriers considerable. Environmental modification may be more effective than behaviour change techniques because it allows large populations to make healthier choices with less effort. The use of descriptive norms (DN) and nudging has shown promise in dietary behaviour change without compromising consumer satisfaction. Snacking prevalence is rising with evidence for increased snacking in the workplace, and snacks are associated with low diet quality (DQ), obesity and cardiometabolic risk. Salience of food promotes food intake suggesting common workplace features such as office cake consumption and observation of colleagues snacking at their desks could influence employees' food intake and affect WHPP efforts. Therefore research to investigate the effects of non-canteen food salience on workplace eating behaviour is warranted.

Introduction

As obesity prevalence continues to rise globally, together with associated co-morbidities and healthcare costs (NCD Risk Factor Collaboration, 2016), actions to address this trend are important. In England in 2015, 41% of adults were overweight (body mass index (BMI) 25.0 – 29.9kg/m^2) and 27% adults were obese (BMI ≥30.0kg/m^2) (Health Survey for England, 2016). Obesity is a risk factor for non-communicable diseases including cardiovascular

disease, diabetes, musculoskeletal issues and some cancers (World Health Organisation (WHO), 2016), non-alcoholic fatty liver disease (Lonardo, Sookoian, Pirola & Targher, 2016), Alzheimer's disease (Kandimalla, Thirumala & Reddy, 2016; Sandhir & Gupta, 2015), renal disorders (Prospective Studies Collaboration, 2009) and mental health disorders (National Obesity Observatory, 2011). The costs of obesity in the UK in 2015 were modelled at £27bn (Butland et al., 2007).

Employees spend approximately two thirds of their waking hours working (WHO, 2013) and workplaces give access to 75% of the UK population (Office for National Statistics, 2017). The workplace therefore represents an important setting to promote healthy lifestyle choices (Black 2008; Engbers, van Poppel, Chin A Paw & van Mechlelen, 2005; Heinen & Darling, 2009; NiMhurchu, Aston & Jebb, 2010; Quintiliani, Poulsen & Sørensen, 2010).

Diet-related ill-health was estimated to cost the National Health Service £6bn/year (Scarborough, Bhatnagar, Wickramasinghe, Allender, Foster & Rayner, 2011). Obesity is one of the most common workplace health problems (NiMhurchu et al., 2010) and is strongly linked to increased sickness absence (Ferrie, Head, Shipley, Vahtera, Marmot & Kivimäki, 2007; Schmier, Jones & Halpern, 2006; van Duijvenbode, Hoozemans, Van Poppel & Proper, 2009) with 16 million working days lost to obesity-related issues in 2002 (Butland et al., 2007) at an estimated cost to the economy of £15 billion/year (Black & Frost, 2011). Increasing levels of sedentary behaviour in the workplace also contribute to sickness absence (Buckley et al. 2015; Healy et al., 2013) with an estimated two-thirds of work hours spent sitting (Evans, Fawole, Sheriff, Dall, Grant & Ryan, 2012). Sedentary behaviour is significantly ($p<0.05$) positively associated with waist circumference and other cardiometabolic risk factors (Tigbe, Granat, Sattar & Lean, 2017). Improved employee

dietary behaviour and PA benefits employers (Buckley et al., 2015; Heinen & Darling, 2009), increasing productivity and reducing absenteeism and presenteeism (Trogdon, Finkelstein, Hylands, Dellea & Kamal-Bahl, 2008).

Weight loss and weight gain prevention in the workplace

WHPP studies are numerous but conclusions hard to synthesise due to heterogeneity of design, intervention, outcome and quality (Allan et al., 2017; Anderson et al., 2009; Maes et al., 2012). Studies generally employ one or more of three intervention strategies: informational/educational, behavioural, or environmental, and focus on nutrition/dietary behaviour and/or PA. Outcomes include improvement in DQ, dietary behaviours, PA levels, weight/BMI/adiposity change, and cardiometabolic risk factors (Anderson et al., 2009).

Compelling evidence indicates the most effective WHPPs use multicomponent interventions (Anderson et al., 2009; Geaney et al., 2016; Schröer, Haupt & Pieper, 2014; Verweij, Coffeng, van Michelen & Proper, 2011). One systematic review of 47 studies found WHPPs using either more interventions or interventions with greater intensity achieved greater WL (Anderson et al., 2009). Similarly, a narrative review of 15 systematic reviews found that multicomponent programmes using both diet and PA interventions resulted in greater effects than single-component dietary programmes (Schröer et al., 2014). A meta-analysis of 22 randomised controlled trials (RCTs) found that combined diet/PA behavioural interventions significantly reduced mean body fat by 1.12% [95% CI -1.86, -0.38] ($p=0.003$), mean BMI by 0.34kg/m^2 [95% CI -0.46, -0.22] ($p<0.001$) and mean bodyweight by 1.19kg [-1.64, -0.74] ($p<0.001$) (Verweij et al., 2011). A cluster controlled trial comparing the effects on health status of environment-only, education-only and environment/education-combined strategies, found only the combined strategy yielded significant changes in BMI (-

1.2kg/m^2 [95% CI (Confidence Interval) -2.38,-0.018], p<0.05) (Geaney et al., 2016). Contrastingly, one systematic review of interventions to improve DQ found limited evidence for diet interventions, and inconclusive evidence for the effectiveness of combined diet/PA interventions (Maes et al., 2012). However, due to the poor intervention quality and low intervention intensity in the studies reviewed by Maes et al. – 17 out of the 30 studies reviewed were education-only - small effect sizes could be expected (Mooney, Frank & Anderson, 2013).

An example of a multicomponent WHPP with typical interventions was a cluster RCT of 806 hospital workers which found a nonsignificant (p=0.06) dose-response relationship between the number of interventions experienced and BMI reduction (Lemon et al., 2010). Knowledge-based interventions included newsletters, websites, printed materials, social marketing and recipes. Behavioural interventions included interpersonal support for WL, WG prevention, and PA activities and challenges. Environmental interventions included stair-use encouragement through stairwell and elevator signage, distance-marked walking routes, cafeteria changes such as menu modification and on-pack nutrition information and events such as farmers markets.

Identification of mediating factors within multicomponent WHPPs is challenging, although robust evidence supports the effectiveness of WHPPs involving environmental modification. Systematic reviews of RCTs found strong evidence that interventions with an environmental component improved DQ (Engbers et al., 2005) and dietary behaviour (Allan et al., 2017). Using subgroup analysis, one meta-analysis of 22 RCTs established that combined diet/PA interventions including an environmental component resulted in greater WL than those without (-1.5kg [95% CI -1.82, -1.17] and -1.01kg [95% CI -1.63, -0.38] respectively) (Verweij

et al., 2011). Two studies found environmental WHPPs were more effective and sustainable than targeting at-risk individuals (Donohoe Mather & McGurk, 2014; Malik, Pan, Willett & Hu, 2013). In summary, multicomponent WHPPs with an environmental component appear more likely to prevent WG through change in dietary behaviour than PA. More research is needed to identify which factors modify behaviour long-term.

Although WHPP adiposity changes are often small, inconclusive or absent, they could be clinically significant (Mattke et al., 2013). Firstly, control/comparison groups in controlled trials often increased adiposity when the intervention group did not. For example, a two-year randomised trial found the mean proportion of overweight/obese employees increased in the control by 3.3% (p=0.23) (Fernandez et al., 2015); Geaney et al. (2016) saw a 0.5kg (±2.6) mean WG in the control (p=0.098); and Goetzel et al. (2010) saw a mean WG of 1.3lb in the control (p=0.23). Secondly, if small-effect trial results were extrapolated to larger populations, they may translate into meaningful health benefits (Anderson et al., 2009; Mooney et al., 2013). Both findings have implications for WG prevention and reinforce the workplace as an important setting for lifestyle intervention.

One reason WHPP WL is not greater could be that interventions' dietary recommendations might not be optimal for WL. Interventions follow dietary guidelines (Department of Health, 1991; McGuire, 2016; Scientific Advisory Committee on Nutrition (SACN), 2015) to reduce fat intake and increase carbohydrate intake which several studies achieved (Geaney et al., 2016; Goetzel et al., 2010; Lowe et al., 2010; NiMhurchu et al., 2010) indicating the interventions succeeded in changing dietary behaviour. However, there is evidence that high carbohydrate intake contributes to obesity (Ebbeling et al., 2012; Shai et al., 2009; Volek et al., 2009), low fat intake (<15% total energy intake [TEI]) is positively associated

with metabolic syndrome (Park, Ahn & Lee, 2016) and that a high fat diet might not be contraindicated (Chang, Vethakkan, Nesaretna, Sanders & Sieveniper, 2016; Harcombe, Baker, DiNicolantonio, Grace & Davies, 2016; Tobias, Chen, Manson, Ludwig, Willett & Hu, 2015) although this is debated (Hall et al., 2015; Hall & Guo, 2017; Macdonald, 2016; Stanhope, 2016). More research is needed into the long-term effects of diets of different macronutrient composition on WL, but it cannot be ruled out that following dietary guidelines impacts WL effect sizes.

Practical considerations affecting WHPPs

Environment-based WHPPs may be effective because they make the environment less obesogenic (Swinburn et al., 2011; Wansink & Chandon, 2014) allowing participants to make healthier lifestyle choices without conscious effort (Glanz, Lankenau, Foerster, Temple, Mullis & Schmid, 1995; Marteau, Hollands & Fletcher, 2012; Salmon, Fennis, de Ridder, Adriannse & de Vet, 2014; Stokols, 1996; Stokols, Grzywacz, McMahan & Phillips, 2003; Wansink & Chandon, 2014). Compared to behaviour change approaches, they potentially reach more people (Sallis, Cervero, Ascher, Henderson, Kraft & Kerr, 2006), including those with poor literacy, numeracy and self-regulatory skills (Hollands et al., 2013), and are potentially cheaper and more sustainable (Allan et al., 2017). A narrative review of factors influencing the success of WHPPs identified a climate of health as key: where the ability to lead a healthy lifestyle is the 'default setting' (Goetzel et al., 2014). Relatedly, a Danish study concluded that a good general work environment is essential for workplace health (Jørgensen, Villadsen, Burr, Punnett & Holtermann, 2015). Visible, active support from all levels of management has also been identified as important (Black, 2008; Chartered Institute of Personnel & Development, 2017; Fitzgerald, Geaney, Kelly, McHugh & Perry,

2016; Goetzel at al., 2010; Kilpatrick, Blizzard, Sanderson, Teale, Jose, & Venn, 2017; Mackison, Mooney, Macleod & Anderson, 2016; Mattke et al., 2013).

Logistical issues can impede WHPP implementation. The impact of a hospital-based WHPP was reduced because implementation of some of the canteen modifications was delayed (LaCaille et al., 2016). Similarly, studies investigating price-incentivised healthy food options identified barriers such as sourcing appropriately-priced healthy ingredients, and renegotiating catering contracts while accommodating profit targets and supplier promotions involving energy-dense items (Mackison et al., 2016; Park & Lee, 2016). Factors such as the motivation, flexibility and negotiating ability of the workplace implementation team, and workplace structure and culture can act as either barriers or facilitators (Fitzgerald et al., 2016). Employee resistance to menus and portion size changes were typical challenges (Fitzgerald et al., 2016; Mackison et al., 2016).

The role of social influence in eating behaviour

Robust evidence shows that social influences, particularly modelling, affect the amount and types of foods eaten (Cruwys, Bevelander & Hermans, 2015; Herman, Roth & Polivy, 2003). Reviews found modelling occurs because individuals search for social cues that indicate appropriate behaviour (Herman et al., 2003; Robinson, 2015), and seek to affiliate and ingratiate (Cruwys et al., 2015; Hermans, Engels, Larsen & Herman, 2009; Robinson, Tobias, Shaw, Freeman & Higgs, 2011). A meta-analysis of 38 studies found a large (Lipsey & Wilson, 2001) modelling effect size ($r=0.39$, 95% CI 0.33, 0.44, $p<0.001$) confirming quantitatively that individuals ate more if their companions ate more and less if their companions ate less (Vartanian, Spanos, Herman & Polivy, 2015). People eat more with friends and family (Christakis & Fowler, 2007; Pachucki, Jacques & Christakis, 2011) although this social

facilitation effect is absent when eating with strangers (de Castro, 1994; Hetherington, Anderson, Norton & Newson, 2006; Shide & Rolls, 1991). Regarding food choice, participants were significantly ($p=0.002$) less likely to choose low energy-density foods in the presence of a confederate who chose high energy-density foods than with a low energy-density confederate or when choosing alone (Robinson & Higgs, 2013). Conversely, Pliner & Mann (2004) found individuals selected palatable/unhealthy cookies over unpalatable/healthy cookies regardless of confederate behaviour, suggesting palatability may override social norms in some circumstances. Furthermore, two studies found evidence that social facilitation increases intake of palatable, sweet, high-fat foods rather than savoury food. Compared to eating with strangers, eating with friends significantly ($p<0.001$) increased the number of cookies consumed, not savoury food (Clendenen, Herman & Polivy, 1994) and, compared to eating alone, eating with friends increased energy intake (EI) by 18% mediated by a significant ($p<0.01$) 54.7% increase in cake consumption (Hetherington et al., 2006).

There are few data on the effects of gender on social eating influences (Higgs, 2015) because many studies recruit single-gender, mainly female-only samples. Some studies suggest that women are more likely than men to follow social norms (Bond & Smith, 1996; Eagly & Carli, 1981) possibly due to greater empathetic tendencies (Eagly & Carli, 1981). There is evidence that a larger modelling affect exists when women are involved (Cruwys et al., 2015; Vartanian et al., 2015) supported by a workplace study where women were more likely than men to report noticing colleagues' healthy eating behaviours (Tabak, Hipp, Marx & Brownson, 2015).

Substantial literature examines social norms in dietary behaviour, particularly the relative roles of descriptive and injunctive norms (Cialdini, Reno & Kallgren, 1990). DNs represent behaviour that is typical or normal (the "what is" done) while injunctive norms refer to behaviour that is considered morally-approved (the "what ought" to be done) (Cialdini et al., 1990; Deutsch & Gerard, 1955). Educational/information interventions typically use injunctive norms eg "You should eat five or more fruit and veg a day." DNs represent what people typically do in a situation for example "Most employees take an hour for lunch" and prompt the reaction "if everyone else is doing it, it must be the best thing to do" (Cialdini et al., 1990).

There is conflicting evidence for the effect of DNs. 'Subjective norms' is one of the three constructs underpinning the Theory of Planned Behaviour (TPB) (Ajzen, 1991) which holds that intention is the best predictor of behaviour, informed by attitude, subjective norms and perceived behavioural control (PBC). TPB is widely-tested in health behaviour (Ajzen, 2011; McEachan, Conner, Taylor, Lawton, 2011; Zoellner, Estabrooks, Davy, Chen & You, 2012). Several studies found that attitude and PBC were predictors of intention in health and dietary behaviour (Schifter & Ajzen, 1985; Armitage & Conner, 2001; Palmeira et al., 2007; Povey, Conner, Sparks, James & Shepherd, 2000) whereas subjective norms were not (Emanuel, McCully, Gallagher & Updegraff, 2012; Louis, Chan & Greenbaum, 2009). However, several authors suggested normative behaviour is not well defined or operationalised in research (Armitage & Conner, 2001; Ball, Jeffery, Abbot, McNaughton & Crawford, 2010). A meta-analysis examining normative behaviour in TPB pointed out that the subjective norms outlined in TPB are injunctive norms and found that incorporating DNs strengthened TPB's predictive capability (Rivis & Sheeran, 2003). Therefore the lack of relationship between normative behaviour and intention in TPB studies could be explained

by the exclusion of DNs. Three cross-sectional surveys found eating behaviour (Ball et al., 2010; Lally, Bartle & Wardle, 2011) and SSB consumption (Perkins, Perkins & Craig, 2010) to be strongly associated with DNs both for healthy (Ball et al., 2010) and unhealthy behaviours (Lally et al., 2011; Perkins et al., 2010). An experimental study found that, with adolescents, not only did an injunctive norm message not increase fruit intake, fruit intake reduced, whereas a DN message increased fruit intake (Stok, de Ridder, de Vet & de Wit, 2014). Two sets of studies indicated that individuals are influenced by DNs created by environmental cues that indicate others' behaviour without others being present (Burger et al., 2010; Prinsen, de Ridder & de Vet, 2013) and a narrative review of social modelling supported the importance of DNs in eating behaviour (Cruwys et al., 2015). Translated to the workplace, this suggests employees' eating behaviours may be more influenced by what they observe or believe their colleagues are eating than diet-based health advice or education alone.

DNs have been shown to alter behaviour in a range of domains (Mahler, Kulik, Butler, Gerrard & Gibbons, 2008; Schultz, Nolan, Cialdini, Goldstein & Griskevicius, 2007). This research has developed into 'nudging', where the desired behaviour is expressed as a DN without choice being forced in any direction (Thaler & Sunstein, 2009). Several studies demonstrate that DNs can be used to promote healthy eating behaviour. In a laboratory-based study, students ate significantly ($p<0.05$) more fruit and vegetables during a meal, displacing energy-dense snack food consumption, after exposure to a poster promoting the health benefits of fruit and vegetable consumption expressed as a DN compared to the same information expressed as an injunctive norm (Robinson, Fleming & Higgs, 2014). A study exploring normative behaviour concerning consumption of healthy versus unhealthy snackbars, found significantly ($p<0.001$) more women ignored the injunctive norm (to

choose a healthy snackbar), instead following the DN (to eat the unhealthy snackbar) once their attention was drawn to discarded unhealthy snack wrappers (Burger et al., 2010). In a field study more diners chose a healthy lunch venue rather than an unhealthy lunch venue after exposure to posters carrying relevant DN messages or a control condition (Mollen, Rimal, Ruiter & Kok, 2013).

However, DNs can affect behaviour negatively. As well as inaccurate perceived norms influencing behaviour (Burger et al., 2010; Lally et al., 2011; Lally, Cooke, McGowan, Croker, Bartle & Wardle, 2012; Neighbors, Oster-Aaland, Bertstrom & Lewis, 2006), DNs can influence behaviour in the wrong direction when they convey information that is accurate but unhelpful (Rivis & Sheeran, 2003). For example, informing students about heavy campus alcohol consumption increased consumption (Perkins, Haines & Rice, 2005) and telling students their referent group ate insufficient fruit lowered intended fruit consumption (Stok, de Ridder, de Vet & de Wit, 2012). Additionally, the 'boomerang effect' can influence individuals exhibiting useful behaviours to alter them negatively on discovering their behaviour differs to the average. For example, energy consumption in households with below-average consumption increased when householders learned they were below-average consumers (Schultz et al., 2007). Applied to WHPPs, this could mean that highlighting a workplace's poor dietary behaviour would be counterproductive (Croker, Whitaker, Cooke & Wardle, 2009). It has been suggested that, where healthy behaviours are not the norm, interventions could be based on communicating healthy intentions rather than existing unhealthy behaviour, or creating a perception of healthy behaviour by highlighting existing healthy behaviours (Higgs & Thomas, 2016; Rivis & Sheeran, 2003). Additionally, evidence suggests DNs might be enhanced with judicious use of injunctive norms and/or information (Geaney et al., 2016; Mollen et al., 2013; Schulz et al., 2007). A

laboratory-based study found snack food intake was significantly ($p<0.05$ for both) reduced by exposure to both DN messages (36% reduction) and educational messages (28% reduction) compared to a controlled condition (Robinson, Harris, Thomas, Aveyard & Higgs, 2013). Another laboratory-based study found that although a restrictive rule (explicitly forbidding) and a suggested rule (mildly discouraging) resulted in similar confectionery intake, participants who experienced the restrictive rule reacted afterwards by eating more confectionery when permitted to eat freely (Stok, de Vet, de Wit, Renner & de Ridder, 2015). In summary, the communication of health-based messages needs care if they are to be effective. More research, including in the workplace, is warranted.

Response to DNs is associated with automatic behaviour (Jacobson, Mortensen & Cialdini, 2011; Mollen et al., 2013). Most human behaviour is automatic (Marteau et al., 2012; Marteau, Ogilvie, Roland, Suhrcke & Kelly, 2011), influenced by environmental cues, which in the case of dietary behaviours include availability, proximity, smell and appearance (Hollands et al., 2013; Wansink & Chandon, 2014). It is estimated individuals make 200 automatic food decisions daily (Wansink and Sobal, 2007). The sight and smell of palatable food stimulates reported hunger and motivation to eat (Ferriday & Brunstrom, 2011; Ramaekers, Boesveldt, Lakemond, van Boekel & Luning, 2014) and stimulates the brain's pleasure and reward centres while disrupting consumption monitoring (Stroebe, van Koningsbruggen, Papies & Aarts, 2013). This was illustrated in a study comparing consumption of chocolates in clear versus opaque containers on workers' desks, which found individuals ate an average 67% more ($p<0.05$) chocolates/day when the container was clear compared to opaque (Wansink, Painter & Lee, 2006). Similarly, a series of studies showed more lunch items covered with transparent wrap were eaten compared to lunch items covered in foil (Wansink, 2010). Experimental studies demonstrate the appetising

effects of food odours (Ramaekers et al., 2014, Ramaekers, Luning, Lakemond, van Boekel, Gort & Boesveldt, 2016) whether or not individuals are aware of it (Gaillet-Torrent, Sulmont-Rosse, Issanchou, Chabanet & Chambaron, 2016). Therefore removing or minimising the salience of food in the workplace could reduce unplanned consumption (Wansink, 2004; Wansink & Chandon, 2014), especially for overweight or obese employees who may be more at risk (Ferriday & Brunstrom, 2011). This is an example of 'choice architecture', in which environments are altered to enable healthier choices (Hollands et al., 2013).

Proximity and convenience of food have been shown to influence EI (Maas, de Ridder, de Vet & de Wit, 2011; Rozin, Scott, Dingley, Urbanek, Jiang & Kaltenbach, 2011) including in the workplace. One experiment indicated the more conveniently chocolates were located, the more were eaten (Painter, Wansink & Hieggelke, 2002). On average individuals ate 8.6/day if chocolates were on their desk (visible/convenient), 5.7/day ($p=0.04$) if in a desk drawer (unvisible/convenient) and 3.0/day if positioned two metres away ($p=0.01$) (unvisible/inconvenient). Another workplace-based study that observed the uptake of snacks - that were, as usual, freely-available at no cost – from a snack-station located two metres and five metres respectively from two drinks machines found the uptake of snacks was 69% higher ($p<0.001$) if individuals used the proximal rather than the distal drinks machine (Baskin et al., 2016). Similarly, university-based canteen studies found that confectionery and crisps purchases dropped significantly ($p<0.001$ for both) when they had to be paid for in a separate queue to other lunchtime items (Meiselman, Hedderley, Staddon, Pierson & Symonds, 1994). These were observational studies, but they supported the hypothesis that so-called mindless eating occurs when food salience is increased (Wansink, 2010).

Choice architecture techniques have reduced EI without consumers realising or feeling dissatisfied (Petrescu, Hollands, Couturier, Ng & Marteau, 2016; Wansink & Chandon, 2014). The significantly-increased ($p<0.05$ for all) fruit and vegetable intake in five workplaces (Lassen et al., 2004) was still evident five years later (Thorsen, Lassen, Tetens, Hels & Mikkelsen, 2010) indicating sustained behaviour change. Positioning healthy items at eyelevel and less-healthy items lowdown, and increasing the range of healthy items without eliminating unhealthy items, increased purchase of healthy items while maintaining high customer satisfaction in a worksite canteen (van Kleef, Otten, van Trijp, 2012) and supermarket (Winkler et al., 2016). An RCT is underway to identify how to maximise the effects of a combination of nudges and social norms in workplace food purchasing, choice and consumption (Velema, Vyth & Steenhuis, 2017). However, research is needed about the efficacy of choice architecture on non-canteen workplace eating behaviours prompted by the sight or smell of colleagues eating at their desks, office cake culture, or the convenience of a tea trolley or mobile sandwich provision.

Eating frequency and snacking

Daily eating patterns may affect weight and health risk more than macronutrient proportions (Duffey & Popkin, 2011; Leech, Worsley, Timperio & McNaughton, 2015; Murakami & Livingstone, 2016a; Nicklas, O'Neil & Fulgoni, 2014). Evidence indicates eating frequency has increased in recent decades. Using NHANES data, one study found the mode number of eating occasions (EO)/day rose from three in 1977 to five in 2006 among adults (Popkin & Duffey, 2010) although a more recent study also using contemporaneous National Health and Nutrition Examination Survey (NHANES) data found daily EO had increased significantly ($p<0.0001$) for women only, due to increased snacks (2.09±0.04/day to

2.30±0.04/day) (Kant & Graubard, 2015). It was postulated that results differences arose from using different surveys for baseline data, and design and analysis differences (Kant & Graubard, 2015). Relatedly, two other studies found snacking frequency to be higher in women than men (Hartman, Siegrist & van der Horst, 2011; O'Connor, Brage, Griffin, Wareham & Forouhi, 2015).

Evidence for whether eating frequency (EF) increases adiposity is conflicting. EF/EO was found to be positively associated with EI (Duffey & Popkin, 2011; Leech et al., 2015; McCrory, Howarth, Roberts & Huang, 2011) and adiposity (Murakami & Livingstone, 2015) while other studies found no association between EF/EO and adiposity (Hampl, Heaton & Taylor, 2003; Holmbäck et al., 2010; Mills, Perry & Reicks, 2011; Nicklas et al., 2014). A recent systematic review found there was insufficient evidence to confirm an association between EO and adiposity when misreporting bias is accounted for (Canuto, da Silva Garcez, Kac, de Lira & Olinto, 2017).

Evidence shows snacking is positively associated with EI (Duffey & Popkin, 2011; Kant & Graubard 2015; McCrory et al., 2011; Nicklas et al., 2014) but two cross-sectional studies found snacking frequency was associated with increased EI but not adiposity (Hampl et al., 2003; Nicklas et al., 2014). Another found snacking and adiposity were positively associated for overweight/obese participants and inversely associated for normal weight participants (O'Connor et al., 2015).

The literature on characteristics and effects of snacking is therefore inconclusive, partly due to the lack of definitions for meals or snacks (Hess, Jonnalagadda & Slavin, 2016; Johnson & Anderson, 2010; Leech et al., 2015; Murakami & Livingstone, 2016a; Nicklas et al., 2014) and

heterogeneity of sample and study design. Additionally most studies are cross-sectional so causation cannot be established.

Prevalence data for snacking is scarce but, notwithstanding different analytical methods, is similar where available, ranging from 74% in Brazil in 2008-2009 (Duffey, Pereira & Popkin, 2013) to 97% in the US in 2003-2006 (Piernas & Popkin, 2010). More data exist on the proportion of daily TEI comprising snacks ranging from 19% in Norway in 2010-2011: (Myhre, Løken, Wandel, & Andersen, 2015) to 38% in Finland in 2002 (Ovaskainen, Reinivuo, Tapanainen, Hannila, Korhonen & Pakkala, 2006). This proportion appears to be rising (Kant & Graubard, 2015; Ovaskainen et al., 2006; Piernas & Popkin, 2010).

Eating away from home has increased in recent decades (Department of Environment, Food & Rural Affairs, 2014; Nielson, Siega-Riz & Popkin, 2002; Smith, Ng & Popkin, 2013) and generally has lower DQ than home consumption (Lachat, Nago, Verstraeten, Roberfroid, Van Camp & Kolsteren, 2012). One study found 33% of EO were at non-designated eating locations and unhealthy snack consumption was more likely at non-designated eating locations (eg sofa while watching television, transport, workplace) than designated eating places (OR [odds ratio] 1.34, 95% CI 1.06, 1.70, $p<0.05$) and more likely outside the home (OR 1.45, 95% CI 1.15, 1.83, $p<0.01$) (Liu, Han & Cohen, 2015). Snacking was more likely at work than home whether unhealthy (OR 1.45, 95% CI 1.06, 1.97, $p<0.05$) or healthy (OR 1.46, 95% CI 1.06, 2.02, $p<0.05$) (Liu et al., 2015). Conversely, another study found more snacking at home (58%) than at work (23%) (Myhre et al., 2015). This difference is most likely explained by Myhre et al. excluding drinks from their snack definition. SSB consumption has been causally linked to obesity (Malik et al., 2013; SACN, 2015), and is relevant when considering the effects of snacking.

To summarise, snacking is increasingly prevalent, and occurs more frequently outside the home and in the workplace in particular. Several researchers have identified snacking differences between genders (Hartmann et al., 2011; Kant & Graubard, 2015; O'Connor et al., 2015). This is an area where research would be valuable.

Diet quality of snacking

Snacking has been associated with improved DQ through increased nutrient intake from increased fruit and vegetable intake (Hartmann et al., 2011; Holmbäck et al., 2010; Zizza, Arsiwalla & Ellison, 2010; Zizza & Xu, 2012) and diminished DQ due to increased sugar and fat intake, and energy density (Hartmann, 2011, Murakami & Livingstone, 2016b). There is evidence that choice of snack food and other lifestyle behaviours contribute to snack-related health indicators and adiposity (Duval, Strychar, Cyr, Prud'homme, Rabasa-Lhoret & Doucet, 2008; Hartmann et al., 2011; O'Connor et al., 2015). O'Connor et al. found overweight/obese participants consumed more crisps, confectionery and ice-cream than normal weight participants who consumed more nuts and yoghurt. Hartmann et al. found a gender difference in snack choice with women consuming more fruit compared to men, who were more likely to choose confectionery and crisps, more often.

Several studies found snacks contained more carbohydrate and sugar, and less protein and fat than meals (Murakami & Livingstone, 2016a; 2016b; Myhre et al., 2015; Nicklas et al., 2014). This pattern mirrors a study examining ultra-processed food (UPF) intake which found the mean US UPF intake represented 57.5% of TEI (Martinez Steele, Popkin, Swinburn & Monteiro, 2017). Alongside a strong inverse association between UPF intake and protein, fibre, and micronutrient intakes, and a strong positive association between UPF intake and carbohydrate, added sugars (AS) and saturated fat intakes, this study found an inverse dose-

response relationship between UPF and DQ (Martinez Steele et al., 2017). A study found UPF intake between 1960 and 2010 in Sweden increased by 142%, with SSB intake up by 315% and crisps and confectionery by 367% and the authors hypothesised a positive relationship between UPF intake and obesity, mediated partly by snacks (Juul & Hemmingsson, 2015).

Snacks are associated with AS consumption (Louie & Rangan, 2016; Ovaskainen et al., 2006) which is strongly associated with obesity (SACN, 2015). Snacks contribute 48.3% (95% CI 47.5, 49.0) of AS in the Australian diet (Louie & Rangan, 2016), while 16% of snack EI was AS and 53% carbohydrate in a Norwegian study (Myhre et al., 2015). This is supported by studies that identified cake and similar sweet baked goods as the primary energy-contributors to snack food (Duffey et al., 2013; Myhre et al., 2015; Ovaskainen et al., 2006; Piernas & Popkin, 2010). In the UK in 2013-2014, the main contribution to daily carbohydrate intake was provided by AS-dense snack foods: biscuits: 4%, cakes/buns/pastries/fruit pies: 4%, breads: 19%, table sugar/preserves/confectionery: 8%, fruit juice: 2% and SSBs: 5% (Public Health England (PHE), 2016). Evidence of risk from AS in food has prompted international guidelines on intake reduction to ≤10% of daily TEI (US Department of Health & Human Services and US Department of Agriculture, 2015; WHO, 2015) with an advisory limit of 5% (WHO, 2015), and ≤5% (SACN, 2015). However, mean non-milk extrinsic sugar intake exceeded guidelines in 2013-2014 at 12.3% ±6.9 daily TEI for UK adults (PHE, 2016). Combined, this evidence suggests snack intake is positively associated with UPF, AS intake and obesity. Although observational studies suggest links between UPF and WG (Bowman & Vinyard, 2004; Pereira et al., 2005; Schröder, Fïto & Covas & REGICOR Investigators, 2007), no RCTs confirm this.

Several mechanisms are proposed through which snacking could be linked to obesity. There is well-established evidence that SSBs are causally linked to obesity (Malik et al., 2013; SACN, 2015) through lack of compensation for increased EI from liquid added sugars (Hu, 2013; Lennerz et al., 2013; Mattes & Popkin, 2009). Snack foods are heavily-marketed and developed to be convenient and highly palatable (Juul & Hemmingsson, 2015) and palatability increases EI (Meiselman, King & Webber, 2003; Sørensen, Møller, Flint, Martens & Raben, 2003). There is increasing evidence for UPFs leading to reduced post-prandial energy expenditure (Barr & Wright, 2010; Sørensen et al., 2003).

Cake in the workplace

Throughout history, cake has been associated with celebration in several cultures and has been considered as something to be shared (Humble, 2016). While snacking prevalence has increased (Popkin & Duffey, 2010; Kant & Graubard, 2015), particularly in the workplace (Liu et al., 2015), it has become increasingly common in the UK for individuals to take cakes and other sweet treats into the workplace to share with colleagues and for managers to use cakes to reward or thank staff (Royal College of Surgeons, 2016). It is proposed that this 'office cake culture' (OCC) means the workplace is one of the main locations for workers' daily sugar intake (Royal College of Surgeons, 2016). The origins of OCC have not been researched. It could be speculated that it is driven by increased availability of highly-marketed, conveniently-packaged, palatable products (Juul & Hemmingsson, 2015) or increased cake salience resulting from popular television baking shows. Increased availability and salience could also be enablers of existing tendencies towards commensality: people eating and drinking together at the same time (Kerner, Chou & Warmind, 2015). In evolutionary terms commensality is associated with celebration of

shared food acquisition (Jones, 2008), and commensality and food sharing have been associated with cooperation and trust (Allen-Arave, Gurven & Hill, 2008; Mameli, 2013), a perception of close connection between eating companions (Alley, 2012; Kniffin & Wansink, 2012) and altruism levels (de Backer, Fisher, Poels & Ponnet, 2015). A series of studies comparing US fire stations with and without commensal eating arrangements found significantly increased cooperative behaviour ($p<0.001$) and workgroup performance ($p<0.01$) in groups that ate together (Kniffin, Wansink, Devine & Sobal, 2015). Most of the attributes associated with food sharing are valued in the workplace and contribute to a positive workplace environment (Black, 2008).

The proportion of organisations providing performance-related reward or recognition programmes decreased from 65% in 2012 to 49% in 2014-2015 (Chartered Institute of Personnel & Development, 2015), so the provision of cakes as a management reward (Royal College of Surgeons, 2016) might represent some sort of affordable replacement. The growth of OCC therefore could be influenced by a combination of factors, including an increased value for cost-effective employee recognition, workplace cohesion and celebration, and an innate propensity to share food to promote a cooperative environment, underpinned by availability and salience of low-cost, palatable sweet snack food. There is currently no evidence to support these hypotheses.

Conclusion

Multicomponent WHPPs incorporating an environmental element focussing on dietary behaviour change yield the greatest effects. However, effect sizes are generally small. Barriers to successful WHPP include logistical issues impeding intervention implementation and employee resistance to changes in food offering.

Environmental modification may be more effective than behaviour change techniques targeting at-risk individuals because it allows automatic, effortless health choices by large populations, long-term. Long-established evidence indicates social norms influence behaviour, with DNs proving more effective than injunctive norms at influencing dietary behaviour and intake. DNs are associated with automatic behaviour and the use of DNs and nudging has been shown to influence dietary behaviour change without compromising consumer satisfaction, although limited data exists from the workplace.

Snacking prevalence and number of daily EO is rising and with evidence for increased snacking in the workplace. Unhealthy snacks, including SSBs, are UPF containing high AS and carbohydrate content which are associated with obesity and cardiometabolic risk. Increased EI is associated with the sight, smell, proximity and convenience of palatable food. This suggests that common workplace occasions such as at-desk sandwich sales, office cake culture and observation of colleagues eating at their desks could increase EI and undermine WHPP efforts. Currently no research exists on the salience of or employees' attitudes towards non-canteen food in the workplace. Reducing the salience of food in the workplace might reduce EI and enhance the effects of WG prevention interventions and improve employee health.

List of references

Allan, J., Querstret, D., Banas, K., & Bruin, M. (2017). Environmental interventions for altering eating behaviours of employees in the workplace: A systematic review. *Obesity Reviews, 18*(2), 214-226. doi:10.1111/obr.12470

Allen-Arave, W., Gurven, M., & Hill, K. (2008). Reciprocal altruism, rather than kin selection, maintains nepotistic food transfers on an Ache reservation. *Evolution and Human Behavior, 29*(5), 305-318. doi:10.1016/j.evolhumbehav.2008.03.002

Alley, T. R. (2012). Contaminated and uncontaminated feeding influence perceived intimacy in mixed-sex dyads. *Appetite, 58*(3), 1041. doi:10.1016/j.appet.2012.02.049

Anderson, L. M., Quinn, T. A., Glanz, K., Ramirez, G., Kahwati, L. C., Johnson, D. B., … Task Force on Community Preventive Services. (2009). A systematic review. *American Journal of Preventive Medicine, 37*(4), 340.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organisational Behavior and Human Decision Processes*, 50: 1 79-211

Ajzen, I. (2005). *Attitudes, personality and behavior* (2nd ed.). Maidenhead: Open University Press.

Ajzen, I. (2011). The Theory of Planned Behavior: Reactions and reflections. *Psychology & Health*, 26(9), 1113. doi: 10.1080/0887044 6.2011.613995

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *The British Journal of Social Psychology / the British Psychological Society, 40*(Pt 4), 471-499. doi:10.1348/014466601164939

Baillot, A., Romain, A. J., Boisvert-Vigneault, K., Audet, M., Baillargeon, J. P., Dionne, I. J., … Langlois, M. (2015). Effects of lifestyle interventions that include a physical activity component in class II and III obese individuals: A systematic review and meta-analysis: E0119017. *PLoS One, 10*(4) doi:10.1371/journal.pone.0119017

Ball, K., Jeffery, R. W., Abbott, G., McNaughton, S. A., & Crawford, D. (2010). Is healthy behavior contagious: Associations of social norms with physical activity and healthy eating. *The International Journal of Behavioral Nutrition and Physical Activity, 7*(1), 86-86. doi:10.1186/1479-5868-7-86

Barr, S. B., & Wright, J. C. (2010). Postprandial energy expenditure in whole-food and processed-food meals: Implications for daily energy expenditure. *Food & Nutrition Research, 54*(1), 5144-9. doi:10.3402/fnr.v54i0.5144

Baskin, E., Gorlin, M., Chance, Z., Novemsky, N., Dhar, R., Huskey, K., & Hatzis, M. (2016). Proximity of snacks to beverages increases food consumption in the workplace: A field study. *Appetite, 103*, 244-248. doi:10.1016/j.appet.2016.04.025

Black, C. (2008). *Working for a healthier tomorrow.* Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209782/hwwb-working-for-a-healthier-tomorrow.pdf

Black, C., & Frost, D. (2011). *Health at work – an independent review of sickness absence.* Retrieved from

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/181060/health-at-work.pdf

Blake, H., Zhou, D., & Batt, M. E. (2013). Five-year workplace wellness intervention in the NHS. *Perspectives in Public Health, 133*(5), 262-271. doi:10.1177/1757913913489611

Bond, M. H., & Smith, P. B. (1996). Cross-cultural social and organizational psychology. *Annual Review of Psychology, 47*, 205

Bowman, S. A., & Vinyard, B. T. (2004). Fast food consumption of U.S. adults: Impact on energy and nutrient intakes and overweight status. *Journal of the American College of Nutrition, 23*(2), 163.

Buckley, J. P., Hedge, A., Yates, T., Copeland, R. J., Loosemore, M., Hamer, M., … Dunstan, D. W. (2015). The sedentary office: An expert statement on the growing case for change towards better health and productivity. *British Journal of Sports Medicine, 49*(21), 1357-1362. doi:10.1136/bjsports-2015-094618

Burger, J., Bell, H., Harvey, K., Johnson, J., Stewart, C., Dorian, K. & Swedroe, M. (2010). Nutritious of delicious? The effect of descriptive norm information on food choice. *Journal of Social and Clinical Psychology*, 29(2), 228-242. Retrieved from https://www.scu.edu/media/college-of-arts-and-sciences/psychology/documents/Burger-et-al-2010.pdf

Butland et al. (2007). *Foresight: Tackling obesities: future choices*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/287937/07-1184x-tackling-obesities-future-choices-report.pdf#page=45

Canuto, R., da Silva Garcez, A., Kac, G., de Lira, P., & Olinto, M. (2017). Eating frequency and weight and body composition: a systematic review of observational studies. *Public Health Nutrition*. Advance online publication. doi:10.1017/S1368980017000994

Chang, L. F., Vethakkan, S. R., Nesaretnam, K., Sanders, T. A. B., & Teng, K. (2016). Adverse effects on insulin secretion of replacing saturated fat with refined carbohydrate but not with monounsaturated fat: A randomized controlled trial in centrally obese subjects. *Journal of Clinical Lipidology, 10*(6), 1431-1441.e1. doi:10.1016/j.jacl.2016.09.006

Chartered Institute of Personnel & Development. (2015). *Annual Survey Report: Reward Management*. Retrieved from https://www.cipd.co.uk/knowledge/strategy/reward/surveys

Chartered Institute of Personnel & Development. (2017). *Developing managers to manage sustainable employee engagement, health and wellbeing*. Retrieved from https://www.cipd.co.uk/Images/developing-managers-to-manage-sustainable-employee-engagement-health-and-well-being_2017_tcm18-18364.pdf

Christakis, N. A., & Fowler, J. H. (2007). The spread of obesity in a large social network over 32 years. *The New England Journal of Medicine, 357*(4), 370-379. doi:10.1056/NEJMsa066082

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology, 58*(6), 1015-1026. doi:10.1037/0022-3514.58.6.1015

Clendenen, V. I., Herman, C. P., & Polivy, J. (1994). Social facilitation of eating among friends and strangers. *Appetite, 23*(1), 1.

Croker, H., Whitaker, K. L., Cooke, L., & Wardle, J. (2009). Do social norms affect intended food choice? *Preventive Medicine, 49*(2), 190-193. doi:10.1016/j.ypmed.2009.07.006

Cruwys, T., Bevelander, K. E., & Hermans, R. C. J. (2015). Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite, 86*, 3-18. doi:10.1016/j.appet.2014.08.035

De Backer, C., Fisher, M. L., Poels, K., & Ponnet, K. (2015). “Our" food versus "my" food. Investigating the relation between childhood shared food practices and adult prosocial behavior in Belgium. *Appetite, 84*, 54.

de Castro, J. M. (1994). Family and friends produce greater social facilitation of food intake than other companions. *Physiology & Behavior, 56*(3), 445.

de Graaf, C. (2006). Effects of snacks on energy intake: An evolutionary perspective. *Appetite, 47*(1), 18-23. doi:10.1016/j.appet.2006.02.007

Department of Health, Committee on Medical Aspects of Food Policy (COMA) & Panel on Dietary Reference Values. (1991). *Dietary reference values for food energy and nutrients for the United Kingdom no 41*. London: HMSO

Department for Environment, Food and Rural Affairs. (2014). *Family Food.* Retrieved from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/485982/familyfood-2014report-17dec15.pdf

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *The Journal of Abnormal and Social Psychology, 51*(3), 629-636. doi:10.1037/h0046408

Donohoe Mather, C. M., & McGurk, M. D. (2014). Insights in public health: Promoting healthy snack and beverage choices in Hawai'i worksites: The choose healthy now! Pilot project. *Hawai'i Journal of Medicine & Public Health: A Journal of Asia Pacific Medicine & Public Health, 73*(11), 365.

Duffey, K. J., Pereira, R. A., & Popkin, B. M. (2013). Prevalence and energy intake from snacking in Brazil: Analysis of the first nationwide individual survey. *European Journal of Clinical Nutrition, 67*(8), 868. doi:10.1038/ejcn.2013.60

Duffey, K. J., & Popkin, B. M. (2011). Energy density, portion size, and eating occasions: Contributions to increased energy intake in the United States, 1977-2006. *PLoS Medicine, 8*(6), e1001050. doi:10.1371/journal.pmed.1001050

Duval, K., Strychar, I., Cyr, M., Prud'homme, D., Rabasa-Lhoret, R., & Doucet, E. (2008). Physical activity is a confounding factor of the relation between eating frequency and body composition. *The American Journal of Clinical Nutrition, 88*(5), 1200.

Eagly, A. H., & Carli, L. L. (1981). Sex of researchers and sex-typed communications as determinants of sex differences in influenceability: A meta-analysis of social influence studies. *Psychological Bulletin, 90*(1), 1-20. doi:10.1037//0033-2909.90.1.1

Ebbeling, C. B., Swain, J. F., Feldman, H. A., Wong, W. W., Hachey, D. L., Garcia-Lago, E., & Ludwig, D. S. (2012). Effects of dietary composition on energy expenditure during weight-loss maintenance. *Jama, 307*(24), 2627.

Emanuel, A. S., McCully, S. N., Gallagher, K. M., & Updegraff, J. A. (2012). Theory of planned behavior explains gender difference in fruit and vegetable consumption. *Appetite, 59*(3), 693-697. doi:10.1016/j.appet.2012.08.007

Engbers, L. H., van Poppel, M. N. M., Chin A Paw, Marijke J.M, & van Mechelen, W. (2005). Worksite health promotion programs with environmental changes. *American Journal of Preventive Medicine, 29*(1), 61-70. doi:10.1016/j.amepre.2005.03.001

Evans, R. E., Fawole, H. O., Sheriff, S. A., Dall, P. M., Grant, P. M., & Ryan, C. G. (2012). Point-of-choice prompts to reduce sitting time at work: A randomized trial. *American Journal of Preventive Medicine, 43*(3), 293.

Fernandez, I. D., Chin, N. P., Devine, C. M., Dozier, A. M., Martina, C. A., McIntosh, S., … Yang, H. (2015). Images of a healthy worksite: A group-randomized trial for worksite weight gain prevention with employee participation in intervention design. *American Journal of Public Health, 105*(10), 2167-2174. doi:10.2105/AJPH.2014.302397

Ferriday, D., & Brunstrom, J. M. (2011). 'I just can't help myself': Effects of food-cue exposure in overweight and lean individuals. *International Journal of Obesity (2005), 35*(1), 142.

Ferrie, J. E., Head, J., Shipley, M. J., Vahtera, J., Marmot, M. G., & Kivimäki, M. (2007). BMI, obesity, and sickness absence in the Whitehall II study. *Obesity, 15*(6), 1554-1564. doi:10.1038/oby.2007.184

Fitzgerald, S., Geaney, F., Kelly, C., McHugh, S., & Perry, I. J. (2016). Barriers to and facilitators of implementing complex workplace dietary interventions: Process

evaluation results of a cluster controlled trial. *BMC Health Services Research, 16*, 139. doi:10.1186/s12913-016-1413-7

Gaillet-Torrent, M., Sulmont-Rossé, C., Issanchou, S., Chabanet, C., & Chambaron, S. (2014). Impact of a non-attentively perceived odour on subsequent food choices. *Appetite, 76*, 17-22. doi:10.1016/j.appet.2014.01.009

Geaney, F., Kelly, C., Di Marrazzo, J. S., Harrington, J. M., Fitzgerald, A. P., Greiner, B. A., & Perry, I. J. (2016). The effect of complex workplace dietary interventions on employees' dietary intakes, nutrition knowledge and health status: A cluster controlled trial. *Preventive Medicine, 89*, 76-83. doi:10.1016/j.ypmed.2016.05.005

Glanz, K., Lankenau, B., Foerster, S., Temple, S., Mullis, R., & Schmid, T. (1995). Environmental and policy approaches to cardiovascular disease prevention through nutrition: Opportunities for state and local action. *Health Education Quarterly, 22*(4), 512.

Goetzel, R. Z., Henke, R. M., Tabrizi, M., Pelletier, K. R., Loeppke, R., Ballard, D. W., … Metz, R. D. (2014). Do workplace health promotion (wellness) programs work? *Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine, 56*(9), 927.

Goetzel, R. Z., Roemer, E. C., Pei, X., Short, M. E., Tabrizi, M. J., Wilson, M. G., … Baase, C. M. (2010). Second-year results of an obesity prevention program at the Dow Chemical Company. *Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine, 52*(3), 291.

Hall, K. D., Bemis, T., Brychta, R., Chen, K. Y., Courville, A., Crayner, E. J., … Yannai, L. (2015). Calorie for calorie, dietary fat restriction results in more body fat loss than carbohydrate restriction in people with obesity. *Cell Metabolism, 22*(3), 427.

Hall, K., & Guo, J. (2017). Obesity energetics: Body weight regulation and the effects of diet composition. *Gastroenterology,* 152(7), 1718-1727. doi:10.1053/j.gastro.2017.01.052

Hampl, J. S., Heaton, C. L. B., & Taylor, C. A. (2003). Snacking patterns influence energy and nutrient intakes but not body mass index. *Journal of Human Nutrition and Dietetics, 16*(1), 3-11. doi:10.1046/j.1365-277X.2003.00417.x

Harcombe, Z., Baker, J. S., DiNicolantonio, J. J., Grace, F., & Davies, B. (2016). Evidence from randomised controlled trials does not support current dietary fat guidelines: A systematic review and meta-analysis. *Open Heart, 3*(2), e000409. doi:10.1136/openhrt-2016-000409

Hartmann, C., Siegrist, M., & van der Horst, K. (2013). Snack frequency: Associations with healthy and unhealthy food choices. *Public Health Nutrition, 16*(8), 1487. doi:10.1017/S1368980012003771

Health Survey for England. (2016). *Health Survey for England, 2015.* Retrieved from http://content.digital.nhs.uk/searchcatalogue?productid=23711&q=health+survey+for+england+2015&sort=Relevance&size=10&page=1#top

Healy, G. N., Eakin, E. G., Lamontagne, A. D., Owen, N., Winkler, E. A. H., Wiesner, G., … Dunstan, D. W. (2013). Reducing sitting time in office workers: Short-term efficacy of a multicomponent intervention. *Preventive Medicine, 57*(1), 43-48. doi:10.1016/j.ypmed.2013.04.004

Heinen, L., & Darling, H. (2009). Addressing obesity in the workplace: The role of employers. *The Milbank Quarterly, 87*(1), 101-122. doi:10.1111/j.1468-0009.2009.00549.x

Herman, C. P., Roth, D. A., & Polivy, J. (2003). Effects of the presence of others on food intake: A normative interpretation. *Psychological Bulletin, 129*(6), 873-886. doi:10.1037/0033-2909.129.6.873

Hermans, R. C. J., Engels, R. C. M. E., Larsen, J. K., & Herman, C. P. (2009). Modeling of palatable food intake. The influence of quality of social interaction. *Appetite, 52*(3), 801-804. doi:10.1016/j.appet.2009.03.008

Hess, J. M., Jonnalagadda, S. S., & Slavin, J. L. (2016). What is a snack, why do we snack, and how can we choose better snacks? A review of the definitions of snacking, motivations to snack, contributions to dietary intake, and recommendations for improvement. *Advances in Nutrition (Bethesda, Md.), 7*(3), 466-475. doi:10.3945/an.115.009571

Hetherington, M. M., Anderson, A. S., Norton, G. N. M., & Newson, L. (2006). Situational effects on meal intake: A comparison of eating alone and eating with others. *Physiology & Behavior, 88*(4), 498-505. doi:10.1016/j.physbeh.2006.04.025

Higgs, S. (2015). Social norms and their influence on eating behaviours. *Appetite, 86*, 38-44. doi:10.1016/j.appet.2014.10.021

Higgs, S., & Thomas, J. (2016). Social influences on eating. *Current Opinion in Behavioral Sciences*, 9(1-6). doi:10.1016/j.cobeha.2015.10.005

Hollands, G. J., Shemilt, I., Marteau, T. M., Jebb, S. A., Kelly, M. P., Nakamura, R., … Ogilvie, D. (2013). Altering micro-environments to change population health behaviour:

Towards an evidence base for choice architecture interventions. *BMC Public Health, 13*(1), 1218. doi:10.1186/1471-2458-13-1218

Holmbäck, I., Ericson, U., Gullberg, B., Wirfält, E., Institutionen för kliniska vetenskaper, Malmö, Research group of Nutrition Epidemiology, … Lund University. (2010). A high eating frequency is associated with an overall healthy lifestyle in middle-aged men and women and reduced likelihood of general and central obesity in men. *British Journal of Nutrition, 104*(7), 1065-1073. doi:10.1017/S0007114510001753

Hu, F. B. (2013). Resolved: There is sufficient scientific evidence that decreasing sugar-sweetened beverage consumption will reduce the prevalence of obesity and obesity-related diseases. *Obesity Reviews, 14*(8), 606-619. doi:10.1111/obr.12040

Humble, N. (2016). *Cake: a global history*. London: Reaktion

Jacobson, R. P., Mortensen, C. R., & Cialdini, R. B. (2011). Bodies obliged and unbound: Differentiated response tendencies for injunctive and descriptive social norms. *Journal of Personality and Social Psychology, 100*(3), 433-448. doi:10.1037/a0021470

Johnson, G. H., & Anderson, G. H. (2010). Snacking definitions: Impact on interpretation of the literature and dietary recommendations. *Critical Reviews in Food Science and Nutrition, 50*(9), 848-871. doi:10.1080/10408390903572479

Jones, M. (2008). *Feast: Why humans share food*. Oxford: Oxford University Press

Jørgensen, M. B., Villadsen, E., Burr, H., Mortensen, O. S., & Holtermann, A. (2015). Does workplace health promotion in Denmark reach relevant target groups? *Health Promotion International, 30*(2), 318-327. doi:10.1093/heapro/dat041

Juul, F., & Hemmingsson, E. (2015). Trends in consumption of ultra-processed foods and obesity in Sweden between 1960 and 2010. *Public Health Nutrition, 18*(17), 3096-12. doi:10.1017/S1368980015000506

Kandimalla, R., Thirumala, V., & Reddy, P. H. (2017). Is Alzheimer's disease a type 3 diabetes? A critical appraisal. *BBA - Molecular Basis of Disease, 1863*(5), 1078-1089. doi:10.1016/j.bbadis.2016.08.018

Kant, A. K., & Graubard, B. I. (2015). 40-year trends in meal and snack eating behaviors of American adults. *Journal of the Academy of Nutrition and Dietetics, 115*(1), 50-63. doi:10.1016/j.jand.2014.06.354

Kerner, S., Chou, C., & Warmind, M. (2015). *Commensality. From everyday food to feast.* London: Bloomsbury

Kilpatrick, M., Blizzard, L., Sanderson, K., Teale, B., Jose, K., & Venn, A. (2017). Barriers and facilitators to participation in workplace health promotion (WHP) activities: Results from a cross-sectional survey of public-sector employees in Tasmania, Australia. *Health Promotion Journal of Australia,* doi:10.1071/HE16052

Kniffin, K. M., & Wansink, B. (2012). It's not just lunch: Extra-pair commensality can trigger sexual jealousy: E40445. *PLoS One, 7*(7) doi:10.1371/journal.pone.0040445

Kniffin, K. M., Wansink, B., Devine, C. M., & Sobal, J. (2015). Eating together at the firehouse: How workplace commensality relates to the performance of firefighters. *Human Performance, 28*(4), 281-306. doi:10.1080/08959285.2015.1021049

LaCaille, L. J., Schultz, J. F., Goei, R., LaCaille, R. A., Dauner, K. N., de Souza, R., … Regal, R. (2016). Go!: Results from a quasi-experimental obesity prevention trial with hospital employees. *BMC Public Health, 16*, 171.

Lachat, C., Nago, E., Verstraeten, R., Roberfroid, D., Van Camp, J., & Kolsteren, P. (2012). Eating out of home and its association with dietary intake: A systematic review of the evidence. *Obesity Reviews, 13*(4), 329-346. doi:10.1111/j.1467-789X.2011.00953.x

Lally, P., Bartle, N., & Wardle, J. (2011). Social norms and diet in adolescents. *Appetite, 57*(3), 623-627. doi:10.1016/j.appet.2011.07.015

Lally, P., Cooke, L., McGowan, L., Croker, H., Bartle, N. & Wardle, J. (2012). Parents' misperceptions of social norms for pre-school children's snacking behaviour. *Public Health Nutrition* (9), 1678-1682. doi: 10.1017/1368980012000328

Lassen, A., Thorsen, A. V., Trolle, E., Elsig, M., & Ovesen, L. (2004). Successful strategies to increase the consumption of fruits and vegetables: Results from the Danish '6 a day' work-site canteen model study. *Public Health Nutrition, 7*(2), 263-270. doi:10.1079/PHN2003532

Leech, R. M., Worsley, A., Timperio, A., & McNaughton, S. A. (2015). Understanding meal patterns: Definitions, methodology and impact on nutrient intake and diet quality. *Nutrition Research Reviews, 28*(1), 1-21. doi:10.1017/S0954422414000262

Lemon, S. C., Zapka, J., Li, W., Estabrook, B., Rosal, M., Magner, R., … Hale, J. (2010). Step ahead a worksite obesity prevention trial among hospital employees. *American Journal of Preventive Medicine, 38*(1), 27.

Lennerz, B. S., Alsop, D. C., Holsen, L. M., Stern, E., Rojas, R., Ebbeling, C. B., … Ludwig, D. S. (2013). Effects of dietary glycemic index on brain regions related to reward and craving in men. *The American Journal of Clinical Nutrition, 98*(3), 641-647. doi:10.3945/ajcn.113.064113

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA; London;: Sage Publications.

Liu, J. L., Han, B., & Cohen, D. A. (2015). Associations between eating occasions and places of consumption among adults. *Appetite, 87*, 199-204. doi:10.1016/j.appet.2014.12.217

Lonardo, A., Sookoian, S., Pirola, C. J., & Targher, G. (2016). Non-alcoholic fatty liver disease and risk of cardiovascular disease. *Metabolism: Clinical and Experimental, 65*(8), 1136-1150. doi:10.1016/j.metabol.2015.09.017

Louie, J. C. Y., & Rangan, A. M. (2016). Patterns of added sugars intake by eating occasion among a nationally representative sample of Australians. *European Journal of Nutrition,* doi:10.1007/s00394-016-1303-0

Louis, W. R., Chan, M. K., & Greenbaum, S. (2009). Stress and the theory of planned behavior: Understanding healthy and unhealthy eating intentions. *Journal of Applied Social Psychology, 39*(2), 472-493. doi:10.1111/j.1559-1816.2008.00447.x

Lowe, M. R., Tappe, K. A., Butryn, M. L., Annunziato, R. A., Coletta, M. C., Ochner, C. N., & Rolls, B. J. (2010). An intervention study targeting energy and nutrient intake in worksite cafeterias. *Eating Behaviors, 11*(3), 144-151. doi:10.1016/j.eatbeh.2010.01.002

Maas, J., de Ridder, D. T. D., de Vet, E., & de Wit, J. B. F. (2012). Do distant foods decrease intake? The effect of food accessibility on consumption. *Psychology & Health, 27*(sup2), 59-73. doi:10.1080/08870446.2011.565341

Macdonald, I. A. (2016). A review of recent evidence relating to sugars, insulin resistance and diabetes. *European Journal of Nutrition, 55*(S2), 17-23. doi:10.1007/s00394-016-1340

Mackison, D., Mooney, J., Macleod, M., & Anderson, A. S. (2016). Lessons learnt from a feasibility study on price incentivised healthy eating promotions in workplace catering establishments. *Journal of Human Nutrition and Dietetics, 29*(1), 86-94. doi:10.1111/jhn.12283

Maes, L., Van Cauwenberghe, E., Van Lippevelde, W., Spittaels, H., De Pauw, E., Oppert, J., … De Bourdeaudhuij, I. (2012). Effectiveness of workplace interventions in Europe promoting healthy eating: A systematic review. *European Journal of Public Health, 22*(5), 677-683. doi:10.1093/eurpub/ckr098

Mahler, H. I. M., Kulik, J. A., Butler, H. A., Gerrard, M., & Gibbons, F. X. (2008). Social norms information enhances the efficacy of an appearance-based sun protection intervention. *Social Science & Medicine, 67*(2), 321-329. doi:10.1016/j.socscimed.2008.03.037

Malik, V. S., Pan, A., Willett, W. C., & Hu, F. B. (2013). Sugar-sweetened beverages and weight gain in children and adults: A systematic review and meta-analysis. *The American Journal of Clinical Nutrition, 98*(4), 1084-1102. doi:10.3945/ajcn.113.058362

Mameli, M. (2013). Meat made us moral: A hypothesis on the nature and evolution of moral judgment. *Biology & Philosophy, 28*(6), 903-931. doi:10.1007/s10539-013-9401-3

Marteau, T., Ogilvie, D., Roland, M., Suhrcke, M. & Kelly, M. (2011). Judging nudging: Can nudging improve population health? *BMJ: British Medical Journal, 342*(7791), 263-265. doi:10.1136/bmj.d228

Marteau, T. M., Hollands, G. J., & Fletcher, P. C. (2012). Changing human behavior to prevent disease: The importance of targeting automatic processes. *Science (New York, N.Y.), 337*(6101), 1492.

Martínez Steele, E., Popkin, B. M., Swinburn, B., & Monteiro, C. A. (2017). The share of ultra-processed foods and the overall nutritional quality of diets in the US: Evidence from a nationally representative cross-sectional study. *Population Health Metrics, 15*(1) doi:10.1186/s12963-017-0119-3

Mattes, R. D., & Popkin, B. M. (2009). Nonnutritive sweetener consumption in humans: Effects on appetite and food intake and their putative mechanisms. *The American Journal of Clinical Nutrition, 89*(1), 1-14. doi:10.3945/ajcn.2008.26792

Mattke, S., Liu, H., Caloyeras, J., Huang, C., van Busum, K., Khodyakov, D. & Shier, V. (2013). *Workplace wellness programs study. Final report*. Retrieved from: http://www.rand.org/content/dam/rand/pubs/research_reports/RR200/RR254/RAND_RR254.sum.pdf

McCrory, M. A., Howarth, N. C., Roberts, S. B., & Huang, T. T. (2011). Eating frequency and energy regulation in free-living adults consuming self-selected diets. *The Journal of Nutrition, 141*(1), 148-153. doi:10.3945/jn.109.114991

McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the theory of planned behaviour: A meta-analysis. *Health Psychology Review, 5*(2), 97-48. doi:10.1080/17437199.2010.521684

McGuire, S. (2016). Scientific report of the 2015 Dietary Guidelines Advisory Committee. Washington, DC: US Departments of Agriculture and Health and Human Services, 2015. *Advances in Nutrition (Bethesda, Md.), 7*(1), 202-204. doi:10.3945/an.115.011684

Meiselman, H. L., Hedderley, D., Staddon, S. L., Pierson, B. J., & Symonds, C. R. (1994). Effect of effort on meal selection and meal acceptability in a student cafeteria. *Appetite, 23*(1), 43

Meiselman, H. L., King, S. C., & Weber, A. J. (2003). Relationship of acceptability to consumption in a meal-testing environment, and the use of intake to predict product acceptability in a meal. *Appetite, 41*(2), 203-204. doi:10.1016/S0195-6663(03)00025-4

Mills, J. P., Perry, C. D., & Reicks, M. (2011). Eating frequency is associated with energy intake but not obesity in midlife women. *Obesity, 19*(3), 552-559. doi:10.1038/oby.2010.265

Mollen, S., Rimal, R. N., Ruiter, R. A. C., & Kok, G. (2013). Healthy and unhealthy social norms and food selection: Findings from a field-experiment. *Appetite, 65*, 83-89. doi:10.1016/j.appet.2013.01.020

Mooney, J. D., Frank, J., & Anderson, A. S. (2013). Workplace dietary improvement initiatives ought not to be discouraged by modest returns from low-intensity interventions. *European Journal of Public Health, 23*(2), 193.

Murakami, K., & Livingstone, M. B. E. (2015). Eating frequency is positively associated with overweight and central obesity in U.S. adults. *The Journal of Nutrition, 145*(12), 2715-2724. doi:10.3945/jn.115.219808

Murakami, K., & Livingstone, M. B. E. (2016a). Energy density of meals and snacks in the British diet in relation to overall diet quality, BMI and waist circumference: Findings from the national diet and nutrition survey. *British Journal of Nutrition, 116*(8), 1479-1489. doi:10.1017/S0007114516003573

Murakami, K., & Livingstone, M. B. E. (2016b). Associations between meal and snack frequency and diet quality and adiposity measures in British adults: Findings from the National Diet and Nutrition Survey. *Public Health Nutrition, 19*(9), 1624-11. doi:10.1017/S1368980015002979

Myhre, J. B., Løken, E. B., Wandel, M., & Andersen, L. F. (2015). The contribution of snacks to dietary intake and their association with eating location among Norwegian adults - results from a cross-sectional dietary survey. *BMC Public Health, 15*(1), 369. doi:10.1186/s12889-015-1712-7

National Obesity Observatory. (2011). *Obesity and mental health*. Retrieved from http://www.noo.org.uk/uploads/doc/vid_10266_Obesity%20and%20mental%20health_FINAL_070311_MG.pdf

NCD Risk Factor Collaboration. (2016). Trends in adult body-mass index in 200 countries from 1975 to 2014: A pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *The Lancet, 387*(10026), 1377. Retrieved from https://search.proquest.com/docview/1780215939/fulltextPDF/BEF3DDF6CEF741DCPQ/1?accountid=14620

Neighbors, C., Oster-Aaland, L., Bergstrom, R. L., & Lewis, M. A. (2006). Event- and context-specific normative misperceptions and high-risk drinking: 21st birthday celebrations and football tailgating. *Journal of Studies on Alcohol, 67*(2), 282.

Nielsen, S. J., Siega-Riz, A. M., & Popkin, B. M. (2002). Trends in food locations and sources among adolescents and young adults. *Preventive Medicine, 35*(2), 107-113. doi:10.1006/pmed.2002.1037

Nicklas, T. A., O'Neil, C. E., & Fulgoni III, V. L. (2014). Snacking patterns, diet quality, and cardiovascular risk factors in adults. *BMC Public Health, 14*(1), 388-388. doi:10.1186/1471-2458-14-388

NiMhurchu, C., Aston, L. M., & Jebb, S. A. (2010). Effects of worksite health promotion interventions on employee diets: A systematic review. *BMC Public Health, 10*(1), 62-62. doi:10.1186/1471-2458-10-62

O'Connor, L., Brage, S., Griffin, S. J., Wareham, N. J., & Forouhi, N. G. (2015). The cross-sectional association between snacking behaviour and measures of adiposity: The fenland study, UK. *The British Journal of Nutrition, 114*(8), 1286. doi:10.1017/S000711451500269X

Office for National Statistics. (2017). *UK labour market: March 2017. Estimates of employment, unemployment, economic inactivity and other employment-related statistics for the UK.* Retrieved from https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/mar2017

Ovaskainen, M., Reinivuo, H., Tapanainen, H., Hannila, M., Korhonen, T., & Pakkala, H. (2006). Snacks as an element of energy intake and food consumption. *European Journal of Clinical Nutrition, 60*(4), 494-501. doi:10.1038/sj.ejcn.1602343

Pachucki, M. A., Jacques, P. F., & Christakis, N. A. (2011). Social network concordance in food choice among spouses, friends, and siblings. *American Journal of Public Health, 101*(11), 2170-2177. doi:10.2105/AJPH.2011.300282

Painter, J. E., Wansink, B., & Hieggelke, J. B. (2002). How visibility and convenience influence candy consumption. *Appetite, 38*(3), 237-238. doi:10.1006/appe.2002.0485

Palmeira, A. L., Teixeira, P. J., Branco, T. L., Martins, S. S., Minderico, C. S., Barata, J. T., … Sardinha, L. B. (2007). Predicting short-term weight loss using four leading health behavior change theories. *The International Journal of Behavioral Nutrition and Physical Activity, 4*(1), 14-14. doi:10.1186/1479-5868-4-14

Park, S., Ahn, J., & Lee, B. (2016). Very-low-fat diets may be associated with increased risk of metabolic syndrome in the adult population. *Clinical Nutrition (Edinburgh, Scotland), 35*(5), 1159-1167. doi:10.1016/j.clnu.2015.09.010

Park, S., & Lee, J. (2016). 'When operating a cafeteria, sales come before nutrition' - finding barriers and facilitators to serving reduced-sodium meals in worksite cafeterias. *Public Health Nutrition, 19*(8), 1506-11. doi:10.1017/S1368980015002827

Pereira, M. A., Kartashov, A. I., Ebbeling, C. B., Van Horn, L., Slattery, M. L., Jacobs, D. R., & Ludwig, D. S. (2005). Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *The Lancet, 365*(9453), 36-42. doi:10.1016/S0140-6736(04)17663-0

Perkins, H. W., Haines, M. P., & Rice, R. (2005). Misperceiving the college drinking norm and related problems: A nationwide study of exposure to prevention information, perceived norms and student alcohol misuse. *Journal of Studies on Alcohol, 66*(4), 470.

Perkins, J., Perkins, H. W., & Craig, D. (2010). Misperceptions of peer norms as a risk factor for sugar-sweetened beverage consumption among secondary school students. *Journal of the American Dietetic Association, 110*(12), 1916-1921. doi:10.1016/j.jada.2010.09.008

Petrescu, D. C., Hollands, G. J., Couturier, D., Ng, Y., & Marteau, T. M. (2016). Public acceptability in the UK and USA of nudging to reduce obesity: The example of reducing sugar-sweetened beverages consumption. *PLoS One, 11*(6), e0155995. doi:10.1371/journal.pone.0155995

Piernas, C., & Popkin, B. M. (2010). Snacking increased among U.S. adults between 1977 and 2006. *The Journal of Nutrition, 140*(2), 325-332. doi:10.3945/jn.109.112763

Pliner, P., & Mann, N. (2004). Influence of social norms and palatability on amount consumed and food choice. *Appetite, 42*(2), 227-237. doi:10.1016/j.appet.2003.12.001

Popkin, B. M., & Duffey, K. J. (2010). Does hunger and satiety drive eating anymore? Increasing eating occasions and decreasing time between eating occasions in the United States. *The American Journal of Clinical Nutrition, 91*(5), 1342-1347. doi:10.3945/ajcn.2009.28962

Povey, R., Conner, M., Sparks, P., James, R., & Shepherd, R. (2000). Application of the theory of planned behaviour to two dietary behaviours: Roles of perceived control and self-efficacy. *British Journal of Health Psychology, 5*(2), 121-139. doi:10.1348/135910700168810

Prinsen, S., de Ridder, D. T. D., & De Vet, E. (2013). Eating by example: Effects of environmental cues on dietary decisions. Appetite, 70, 1. doi:10.1016/j.appet.2013.05.023

Prospective Studies Collaboration. (2009). Body-mass index and cause-specific mortality in 900 000 adults: Collaborative analyses of 57 prospective studies. *The Lancet, 373*(9669), 1083-1096. doi:10.1016/S0140-6736(09)60318-4

Public Health England. (2016). *Results of the National Diet and Nutrition Survey (NDNS) rolling programme for 2012 to 2013 and 2013 to 2014.* Retrieved from https://www.gov.uk/government/statistics/ndns-results-from-years-5-and-6-combined

Quintiliani, L., Poulsen, S., & Sørensen, G. (2010). Healthy eating strategies in the workplace. *International Journal of Workplace Health Management, 3*(3), 182-196. doi:10.1108/17538351011078929

Ramaekers, M. G., Boesveldt, S., Lakemond, C. M., van Boekel, M. A., & Luning, P. A. (2014). Odors: Appetizing or satiating? Development of appetite during odor exposure over time. *International Journal of Obesity (2005), 38*(5), 650.

Ramaekers, M. G., Luning, P. A., Lakemond, C.M., van Boekel, M. A., Gort, G., & Boesveldt, S. (2016). Food preference and appetite after switching between sweet and savoury odours in women: E0146652. *PLoS One, 11*(1) doi:10.1371/journal.pone.0146652

Rivis, A., & Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current Psychology, 22*(3), 218-233. doi:10.1007/s12144-003-1018-2

Robinson, E. (2015). Perceived social norms and eating behaviour: An evaluation of studies and future directions. *Physiology & Behavior, 152*(Pt B), 397-401. doi:10.1016/j.physbeh.2015.06.010

Robinson, E., Fleming, A., & Higgs, S. (2014). Prompting healthier eating: Testing the use of health and social norm based messages. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association, 33*(9), 1057-1064. doi:10.1037/a0034213

Robinson, E., Harris, E., Thomas, J., Aveyard, P., & Higgs, S. (2013). Reducing high calorie snack food in young adults: A role for social norms and health based messages. *The*

International Journal of Behavioral Nutrition and Physical Activity, 10(1), 73-73. doi:10.1186/1479-5868-10-73

Robinson, E., & Higgs, S. (2013). Food choices in the presence of 'healthy' and 'unhealthy' eating partners. *The British Journal of Nutrition, 109*(4), 765. doi:10.1017/S0007114512002000

Robinson, E., Tobias, T., Shaw, L., Freeman, E., & Higgs, S. (2011). Social matching of food intake and the need for social acceptance. *Appetite, 56*(3), 747-752. doi:10.1016/j.appet.2011.03.001

Royal College of Surgeons. (2016). *Position statement. Combatting cake culture: reducing excessive sugar consumption in the workplace.* Downloaded from http://FDS%20position%20statement%20%20Cake%20Culture%20FINAL%20(4).pdf

Rozin, P., Scott, S., Dingley, M., Urbanek, J., Jiang, H., & Kaltenbach, M. (2011). Nudge to nobesity I: Minor changes in accessibility decrease food intake. *Judgment and Decision Making, 6*(4), 323-332.

Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health, 27*, 297.prin

Salmon, S. J., Fennis, B. M., Ridder, D. T. D., Adriaanse, M. A., & de Vet, E. (2014). Health on impulse: When low self-control promotes healthy food choices. *Health Psychology, 33*(2), 103-109. doi:10.1037/a0031785

Sandhir, R., & Gupta, S. (2015). Molecular and biochemical trajectories from diabetes to Alzheimer's disease: A critical appraisal. *World Journal of Diabetes, 6*(12), 1223.

Scarborough, P., Bhatnagar, P., Wickramasinghe, K. K., Allender, S., Foster, C., & Rayner, M. (2011). The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: An update to 2006-07 NHS costs. *Journal of Public Health, 33*(4), 527-535. doi:10.1093/pubmed/fdr033

Schifter, D. E., & Ajzen, I. (1985). Intention, perceived control, and weight loss: An application of the theory of planned behavior. *Journal of Personality and Social Psychology, 49*(3), 843.

Schmier, J. K., Jones, M. L., & Halpern, M. T. (2006). Cost of obesity in the workplace. *Scandinavian Journal of Work, Environment & Health, 32*(1), 5.

Schröder, H., Fïto, M., Covas, M. I., & REGICOR Investigators. (2007). Association of fast food consumption with energy intake, diet quality, body mass index and the risk of obesity in a representative Mediterranean population. *British Journal of Nutrition, 98*(6), 1274-1280. doi:10.1017/S0007114507781436

Schröer, S., Haupt, J., & Pieper, C. (2014). Evidence-based lifestyle interventions in the workplace--an overview. *Occupational Medicine (Oxford, England), 64*(1), 8-12. doi:10.1093/occmed/kqt136

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science, 18*(5), 429-434. doi:10.1111/j.1467-9280.2007.01917.x

Scientific Advisory Committee on Nutrition. (2015). *Carbohydrates and Health*. Retrieved from

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf

Shai, I., Schwarzfuchs, D., Henkin, Y., Shahar, D. R., Witkow, S., Greenberg, I., … Dietary Intervention Randomized Controlled Trial (DIRECT) Group. (2008). Weight loss with a low-carbohydrate, Mediterranean, or low-fat diet. *The New England Journal of Medicine, 359*(3), 229-241. doi:10.1056/NEJMoa0708681

Shide, D., & Rolls, B. (1991). Social facilitation of caloric intake in humans by friends but not by strangers. *International Journal of Obesity*, 15 (Suppl. 3), 8

Smith, L. P., Ng, S. W., & Popkin, B. M. (2014). Resistant to the recession: Low-income adults' maintenance of cooking and away-from-home eating behaviors during times of economic turbulence. *American Journal of Public Health, 104*(5), 840-846. doi:10.2105/AJPH.2013.301677

Sørensen, L. B., Møller, P., Flint, A., Martens, M., & Raben, A. (2003). Effect of sensory perception of foods on appetite and food intake: A review of studies on humans. *International Journal of Obesity, 27*(10), 1152-1166. doi:10.1038/sj.ijo.0802391

Stanhope, K. L. (2016). Sugar consumption, metabolic disease and obesity: The state of the controversy. *Critical Reviews in Clinical Laboratory Sciences, 53*(1), 52-67. doi:10.3109/10408363.2015.1084990

Stokols, D. (1996). Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion: AJHP, 10*(4), 282.

Stokols, D., Grzywacz, J. G., McMahan, S., & Phillips, K. (2003). Increasing the health promotive capacity of human environments. *American Journal of Health Promotion, 18*(1), 4-13. doi:10.4278/0890-1171-18.1.4

Stok, F. M., de Ridder, D. T. D., de Vet, E., & de Wit, J. B. F. (2012). Minority talks: The influence of descriptive social norms on fruit intake. *Psychology & Health, 27*(8), 956-970. doi:10.1080/08870446.2011.635303

Stok, F. M., de Ridder, D. T. D., de Vet, E., & de Wit, J. B. F. (2012). Minority talks: The influence of descriptive social norms on fruit intake. *Psychology & Health, 27*(8), 956-970. doi:10.1080/08870446.2011.635303

Stok, F. M., De Ridder, D. T. D., De Vet, E., & De Wit, J. B. F. (2014). Don't tell me what I should do, but what others do: The influence of descriptive and injunctive peer norms on fruit consumption in adolescents. *British Journal of Health Psychology, 19*(1), 52-64. doi:10.1111/bjhp.12030

Stok, F. M., Vet, d., E, Wit, J. B. F., Renner, B., & Ridder, d., D.T.D. (2015). Communicating eating-related rules. Suggestions are more effective than restrictions. *Appetite, 86*, 45-53.

Stroebe, W., van Koningsbruggen, G. M., Papies, E. K., & Aarts, H. (2013). Why most dieters fail but some succeed: A goal conflict model of eating behavior. *Psychological Review, 120*(1), 110-138. doi:10.1037/a0030849

Swinburn, B. A., Sacks, G., Hall, K. D., McPherson, K., Finegood, D. T., Moodie, M. L., & Gortmaker, S. L. (2011). Obesity 1: The global obesity pandemic: Shaped by global drivers and local environments. *The Lancet, 378*(9793), 804

Tabak, R. G., Hipp, J. A., Marx, C. M., & Brownson, R. C. (2015). Workplace social and organizational environments and healthy-weight behaviors: E0125424. *PLoS One, 10*(4) doi:10.1371/journal.pone.0125424

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth and happiness* (New international ed.). London: Penguin

Thorsen, A. V., Lassen, A. D., Tetens, I., Hels, O., & Mikkelsen, B. E. (2010). Long-term sustainability of a worksite canteen intervention of serving more fruit and vegetables. *Public Health Nutrition, 13*(10), 1647-1652. doi:10.1017/S1368980010001242

Tigbe, W., Granat, M., Sattar, N., & Lean, M. (2017). Time spent in sedentary posture is associated with waist circumference and cardiovascular risk. *International Journal of Obesity*, 41(5):689-696. doi: 10.1038/ijo.2017.30.

Tobias, D. K., Chen, M., Manson, J. E., Ludwig, D. S., Willett, W., & Hu, F. B. (2015). Effect of low-fat diet interventions versus other diet interventions on long-term weight change in adults: A systematic review and meta-analysis. *The Lancet. Diabetes & Endocrinology, 3*(12), 968.

Trogdon, J. G., Finkelstein, E. A., Hylands, T., Dellea, P. S., & Kamal-Bahl, S. J. (2008). Indirect costs of obesity: A review of the current literature. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity, 9*(5), 489. doi:10.1111/j.1467-789X.2008.00472.x

US Department of Health & Human Services, US Department of Agriculture. (2015). Dietary Guidelines for Americans, 2015 – 2020. Retrieved from

https://health.gov/dietaryguidelines/2015/resources/2015-2020_Dietary_Guidelines.pdf

Van Duijvenbode, D. C., Hoozemans, M. J. M., van Poppel, M N M, & Proper, K. I. (2009). The relationship between overweight and obesity, and sick leave: A systematic review. *International Journal of Obesity, 33*(8), 807-816. doi:10.1038/ijo.2009.121

Van Kleef, E., Otten, K. K., & van Trijp, J.C.M. (2012). Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices. *BMC Public Health, 12*(1), 1072. doi:10.1186/1471-2458-12-1072

Vartanian, L. R., Spanos, S., Herman, C. P., & Polivy, J. (2015). Modeling of food intake: A meta-analytic review. *Social Influence, 10*(3), 119-136. doi:10.1080/15534510.2015.1008037

Velema, E., Vyth, E. L., & Steenhuis, I. H. M. (2017). Using nudging and social marketing techniques to create healthy worksite cafeterias in the Netherlands: Intervention development and study design. *BMC Public Health, 17*(1) doi:10.1186/s12889-016-3927-7

Verweij, L. M., Coffeng, J. K., Mechelen, v., W, & Proper, K. I. (2011). Meta-analyses of workplace physical activity and dietary behaviour interventions on weight outcomes. *Obesity Reviews, 12*(6), 406-429. doi:10.1111/j.1467-789X.2010.00765.x

Volek, J. S., Phinney, S. D., Forsythe, C. E., Quann, E. E., Wood, R. J., Puglisi, M. J., … Feinman, R. D. (2009). Carbohydrate restriction has a more favorable impact on the metabolic syndrome than a low fat diet. *Lipids, 44*(4), 297-309. doi:10.1007/s11745-008-3274-2

Wansink, B. (2004). Environmental factors that increase the food intake and consumption volume of unknowing consumers. *Annual Review of Nutrition, 24*(1), 455-479. doi:10.1146/annurev.nutr.24.012003.132140

Wansink, B. (2010). From mindless eating to mindlessly eating better. *Physiology & Behavior, 100*(5), 454-463. doi:10.1016/j.physbeh.2010.05.003

Wansink, B., & Chandon, P. (2014). Slim by design: Redirecting the accidental drivers of mindless overeating. *Journal of Consumer Psychology,* doi:10.1016/j.jcps.2014.03.006

Wansink, B., Painter, J. E., & Lee, Y. (2006). The office candy dish: Proximity's influence on estimated and actual consumption. *International Journal of Obesity, 30*(5), 871-875. doi:10.1038/sj.ijo.0803217

Wansink, B. & Sobal., J. (2007). Mindless Eating: The 200 Daily Food Decisions We Overlook. *Environment and Behavior*, 39, 106-123. doi: 10.1177/0013916506295573

Winkler, L. L., Christensen, U., Glümer, C., Bloch, P., Mikkelsen, B. E., Wansink, B., & Toft, U. (2016). Substituting sugar confectionery with fruit and healthy snacks at checkout – a win-win strategy for consumers and food stores? a study on consumer attitudes and sales effects of a healthy supermarket intervention. *BMC Public Health, 16*(1) doi:10.1186/s12889-016-3849-4

World Health Organisation. (2013). *Global action plan for the prevention and control of noncommunicable disease 2013-2020*. Retrieved from http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf?ua=1&ua=1

World Health Organisation. (2015). *Sugars intake for adults and children. Guideline*. Retrieved from http://www.who.int/nutrition/publications/guidelines/sugars_intake/en/

World Health Organisation. (2016). *Obesity and overweight fact sheet No311*. Retrieved 28 March 2017 from http://www.who.int/mediacentre/factsheets/fs311/en/

Zizza, C., Arsiwalla, D. & Ellison, K. (2010). Contribution of snacking to older adults' vitamin, carotenoid, and mineral intakes. *Journal of the American Dietetic Association, 110*(5), 768-772. doi:10.1016/j.jada.2010.02.009

Zizza, C. A., & Xu, B. (2012). Snacking is associated with overall diet quality among adults. *Journal of the Academy of Nutrition and Dietetics, 112*(2), 291-296. doi:10.1016/j.jada.2011.08.046

Zoellner, J., Estabrooks, P. A., Davy, B. M., Chen, Y. & You, W. (2012). Exploring the theory of planned behavior to explain sugar-sweetened beverage consumption. *Journal of Nutrition Education and Behavior, 44*(2), 172-177. doi:10.1016/j.jneb.2011.06.010

Department of Clinical Sciences and Nutrition

MSc Obesity & Weight Management

Research project

Office cake consumption in the UK: an exploration of its characteristics and associated attitudes among office workers

Name: Louise Walker

Assessment number: J25321

Student number: 1523909

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Journal appropriate for publication

The target publication for this research is Public Health Nutrition. This research fulfils the publication's criteria for surveying nutritional environments of at-risk populations; analysing behavioural, socio-cultural and environmental determinants of nutrition-related public health; and building workforce capacity for effective public health nutrition action. It also opens a discussion on the effectiveness of current workplace food policy.

Abstract

Objective: The present study explored the characteristics of office cake (OC) consumption and the attitudes of UK-based office workers towards it, to gain insight into the effects of OC consumption on workplace health promotion programmes (WHPPs).

Design: A cross-sectional, self-administered online survey based on the Theory of Planned Behaviour.

Setting: The UK, between 1st and 31st May 2017.

Subjects: Office workers (n=940), n=368 (39.3%) male, aged ≥18yrs

Results: Two thirds of respondents ate OC at least once/week and OC was available in most workplaces up to five times/week. Respondents reported both positive, morale-boosting and negative, weight- and diet-related consequences of OC consumption and identified aspects of OC availability and display that increased consumption. Nearly all (94.8%) respondents thought the ideal OC frequency was once/week or less but only 36.1% said they would support an initiative to reduce OC consumption. Gender and age significantly affected attitudes and behaviour but not the amount eaten.

Conclusion: OC consumption has characteristics which influence the workplace eating environment and eating behaviour. Attitudes towards OC vary widely and are significantly affected by gender and AG. WHPP designers should recognise the existing gender and age profile. Use of choice architectural techniques to effect environmental change might be useful in reducing OC consumption.

Key words: workplace snacking, workplace health promotion, obesity, social norms, workplace environment, choice architecture

Introduction

Obesity prevalence continues to rise globally, as do associated co-morbidities and healthcare costs (NCD Risk Factor Collaboration, 2016), therefore obesity represents a major public health challenge (Public Health England, 2017). The workplace is recognised as an important setting to promote healthy lifestyle choices (Black, 2008; Engbers, van Poppel Chin A Paw & van Mechelen, 2005) and is consequently the focus of numerous studies examining health promotion and weight management. Systematic reviews indicate that multicomponent WHPPs involving an environmental modification component improve diet quality (DQ) (Engbers et al., 2005), and dietary behaviour (Allan et al., 2017). Environment-modification has the potential to make the workplace environment less obesogenic (Swinburn et al., 2011; Wansink & Chandon, 2014) and easier for individuals to make healthier lifestyle choices without effort (Marteau, Hollands & Fletcher, 2012; Salmon, Fennis, de Ridder, Adriannse & de Vet, 2014; Wansink & Chandon, 2014), potentially

reaching more people than individually-targeted behaviour change approaches (Sallis, Cervero, Ascher, Henderson, Kraft & Kerr, 2006).

However, effect sizes resulting from WHPPs targeting both weight loss and weight gain prevention are generally small, inconclusive or absent (Allan et al., 2017; Anderson et al., 2009; Mattke et al., 2013). This could result from a range of causes such as logistical issues with implementation or intervention design, resistance from employees, or abilities of the implementation team (Fitzgerald, Geaney, Kelly, McHugh & Perry, 2016; Mackison, Mooney, Macleod & Anderson, 2016). Alternatively it could result from a change in eating behaviour over recent decades which has seen a rise in eating frequency (Kant & Graubard, 2015; Popkin & Duffey, 2010) and total energy intake (EI) from snacking (Kant & Graubard, 2015; Ovaskainen, Reinivuo, Tapanainen, Hannila, Korhonen & Pakkala, 2006; Piernas & Popkin, 2010). Eating frequency (Leech, Worsley, Timperio & McNaughton, 2015; McCrory, Howarth, Roberts & Huang, 2011) and snack frequency (Duffey & Popkin, 2011, McCrory et al., 2011) are positively associated with increased EI and adiposity (Murakami & Livingstone, 2016a, 2016b).

Neither snacking in the workplace nor its effects on employee health have been widely studied. One US study found unhealthy snacking was significantly more likely in the workplace (Liu, Han & Cohen, 2015) while another found more snacking occurred at home than the workplace (Myhre, Løken, Wandel & Andersen, 2015). However, Myhre et al. did not include sugar-sweetened beverages (SSBs) in their snack definition. Unhealthy snacks are associated with added sugar consumption (Louie & Rangan, 2016; Ovaskainen et al, 2006) and several studies identify cake and similar sweet baked goods as the primary energy contributors to snack food (Duffey, Pereira & Popkin, 2013; Myhre et al., 2015; Nicklas,

O'Neil & Fulgoni, 2014; Ovaskainen et al., 2006; Piernas & Popkin, 2006). Furthermore, added sugars are associated with obesity (Scientific Advisory Committee on Nutrition (SACN), 2015).

In the UK, OC has become a prominent form of workplace snacking and it has been speculated that it contributes to obesity and oral ill-health (Royal College of Surgeons, 2016). A question arises therefore as to whether increased unhealthy snacking in the workplace attenuates the effects of WHPPs. Currently, no studies describe OC consumption or employee attitudes towards it. Therefore the aims of the present study were to explore the characteristics of OC culture in the UK and the attitudes of office workers towards it. For the present study, OC is defined as cakes or other sweet treats (biscuits, pastries, confectionery) taken into the workplace to share with colleagues, as opposed to items taken in for personal consumption.

Method

Study design

A cross-sectional survey was conducted via a self-administered online questionnaire using Bristol Online Surveys (www.onlinesurveys.ac.uk). Due to the lack of an appropriate existing instrument, the 'Office Cake' questionnaire was developed. Primarily items were adapted from previously-validated questionnaires but some were developed following an informal pilot survey conducted on social media. Appendix 1 outlines sources and rationales for questionnaire items. Items about respondents' own OC behaviour were based on the Theory of Planned Behaviour (TPB) constructs of attitude, subjective norms and perceived behavioural control (PBC) (Ajzen, 1991; Ajzen, 2005). The TPB is one of the most widely-

explored behaviour change models (Ajzen, 2011; McEachan et al., 2011; Zoellner, Estabrooks, Davy, Chen & You, 2011), so although the questionnaire was not designed or validated to confirm TPB's role in OC behaviour, its principles provided a framework from which to explore the phenomenon.

Following ethical approval, the questionnaire was piloted and adjustments made to technical settings on four items.

The questionnaire was structured as follows:

Section 1: nine items explored existing OC culture in respondents' workplaces.
Section 2: 20 items explored respondents' own OC behaviour.
Section 3: nine items explored respondents' opinions of OC culture in general.
Section 4: six demographic items requested gender, age group (AG), job role, working pattern and self-reported height (m) and weight (kg) from which body mass index (BMI) was calculated. See Appendix 2 for the questionnaire and participant information.

Participant recruitment

Participants were UK full- or part-time office workers, aged ≥18 years. The definition of an office worker was outlined in the participant information that introduced the questionnaire (Appendix 2). To achieve a sample large and varied enough to be indicative of the UK's 12 million office workers (Office for National Statistics, 2016), two sampling strategies were used. Through cluster sampling (Sedgewick, 2014), four demographically-differing organisations were recruited before the survey opened providing access to approximately 3000 participants (Appendix 5). Organisations agreed to distribute questionnaires internally by email to minimise coverage and sampling error (O'Leary, 2014, Fan & Yan, 2010).

Snowball sampling (Sedgewick, 2013) through the researcher's social media accounts and email contacts enhanced the diversity and size of response, although could have been prone to selection bias (Fan & Yan, 2010). Invitations to participate were objective and neutral to minimise non-response bias. Participants confirmed eligibility and consented by questionnaire submission. In accordance with ethical committee requirements, social media/email questionnaire respondents confirmed they worked in England.

Data collection

Data collection for both strategies occurred between 1st and 31st May 2017. All participants used identical questionnaires, although each participating organisation had a unique identifier to enable comparisons. The questionnaire was voluntary, anonymous and confidential to encourage response (Alford, 2013; Bowling, 2005).

Primary outputs were descriptions of the characteristics of OC culture in the UK. Secondary outputs were descriptions of office workers' attitudes regarding OC culture.

Ethical approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the University of Chester Faculty of Medicine, Dentistry and Life Science Research Ethics Committee. Informed consent was obtained from all participants through questionnaire submission.

Statistical analysis

Data were analysed using the Statistical Package for the Social Sciences version 23 for Windows (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.). Descriptive statistics and cross-tabulations were used to analyse demographic data. Chi-square tests were used

to test for differences between demographic groups. Kruskal Wallis ANOVA were used to test for BMI difference between demographic groups with Mann Whitney-U post hoc tests and Bonferroni adjustment. The significance level was set at $p \leq 0.05$.

After initial data exploration revealed significant demographic differences, variables for Likert scale items were recoded and condensed to further investigate trends in demographic difference. 'Strongly agree' and 'agree' were condensed to 'strongly agree/agree'; 'disagree' and 'strongly disagree' to 'disagree/strongly disagree'; 'sometimes' and 'about half the time' to 'sometimes/half the time'; and 'often' and 'always' to 'often/always'. Responses to weekly OC refusals 'once/day' and 'several times/day' were also condensed. A similar approach has been taken in studies exploring eating behaviour (Ball, Jeffery, Abbott, McNaughton & Crawford, 2010; Hartmann, Siegrist & van der Horst, 2011) including workplace studies (Tabak, Hipp, Marx & Brownson, 2015; Watts, Laska, Larson & Neumark-Sztainer, 2016). See Appendix 3 for condensed variable data.

Results

Across both sampling strategies, 940 respondents completed the questionnaire. Table 1 summarises respondents' demographic characteristics. Missing data was 0.4% for gender, 0.4% for job role, and 0.5% for AG. Percentages presented were calculated excluding missing data.

Participant characteristics

Within the cluster sample, response rates were lower than the 32-50% expected (Hoonakker & Carayon, 2009). The unitary authority withdrew on survey launch, although three people responded independently. Because the cluster sample would not provide a representative sample, data from both strategies were combined to form a single sample of 940 respondents.

Means are presented ± one standard deviation. Of the total sample, 39.3% were male. The mode AG was 30-49 years (30-49s) (55.6%) and 81.0% worked full-time. Mean BMI was 25.9 ± 5.24kg/m^2. Mean BMI was significantly ($p<0.001$) higher in men (26.1 ± 4.4 kg/m^2, [95% Confidence Interval (CI) 25.6, 26.5]) than women (25.7 ±5.7 kg/m^2, [95% CI 25.3, 26.2]). Mean BMI for the 18-29 AG (18-29s) (24.3 ± 4.3 kg/m^2 [95% CI 23.6, 24.9]) was significantly ($p<0.001$ for both) lower than for both 30-49s (26.2 ± 5.5 kg/m^2 [95% CI 25.7, 26.7]) and ≥50 AG (≥50s) (26.3 ±5.1 kg/m^2 [95% CI 25.6, 26.9]). Kruskal Wallis ANOVA found no significant difference in BMI between either OC availability groups ($p=0.815$) or OC consumption frequency groups ($p=0.682$). Job role only had an effect on responses for one item: compared to all other job roles, significantly ($p<0.05$) more director-level respondents never looked forward to OC.

Table 1: Demographic characteristics of survey respondents

	Cluster sampling				Snowball sampling	Total sample
	Motor manufacturer n (%)	Air navigation organisation n (%)	Charity n (%)	Unitary authority n (%)	n (%)	n (%)
Number of respondents	173 (18.4)	107 (11.4%)	38 (4.0)	3 (0.03)	619 (65.9)	940 (100)
Gender						
Male	126 (73.3)	61 (57.5)	6 (15.8)	0 (0)	175 (28.3)	368 (39.3)
Female	46 (26.7)	45 (42.4)	32 (84.2)	3 (100)	442 (71.6)	568 (60.7)
Total	172 (100)	106 (100)	38 (100)	3 (100)	617 (100)	936 (100)
Missing	1	1	-	-	2	4
Age group						
18-29 years	57 (33.1)	17 (15.9)	6 (15.8)	0	92 (15.0)	172 (18.4)
30-49 years	83 (48.3)	54 (50.5)	23 (60.5)	1 (33.3)	359 (58.4)	520 (55.6)
≥50 years	32 (18.6)	36 (33.6)	9 (23.7)	2 (66.7)	164 (26.7)	243 (26.0)
Total	172 (100)	107 (100)	38 (100)	3 (100)	615 (100)	935 (100)
Missing	1	-	-	-	4	5
Job role						
Individual Contributor	134 (77.5)	81 (75.7)	19 (50)	2 (66.7)	368 (59.8)	604 (64.5)
Team leader	28 (16.2)	22 (20.6)	11 (28.9)	1 (33.3)	155 (25.2)	217 (23.2)
Manager	11 (6.4)	4 (3.7)	5 (13.2)	0	59 (9.6)	79 (8.4)
Director	0	0	3 (7.9)	0	33 (5.4)	36 (3.8)
Total	173 (100)	107 (100)	38 (100)	3 (100)	615 (100)	936 (100)
Missing	-	-	-	-	4	4
Pro-rata work time						
Full time	170 (98.3)	100 (93.5)	32 (84.2)	2 (66.7)	457 (73.8)	761 (81.0)
80%	2 (1.2)	4 (3.7)	2 (5.3)	1 (33.3)	78 (12.6)	87 (9.3)
60%	1 (0.6)	3 (2.8)	3 (7.9)	0	53 (8.6)	60 (6.4)
50%	0	0	0	0	18 (2.9)	18 (1.9)
≤40%	0	0	1 (2.6)	0	13 (2.1)	14 (1.5)
Total	173 (100)	107 (100)	38 (100)	3 (100)	619 (100)	940 (100)
Missing	-	-	-	-	-	-

Characteristics of office cake culture

Proportional results for the total sample and full-time workers (FTWs) were similar throughout. OC was typically available at least once/week to 87.0% of FTWs. The mode availability was once-twice/week for 65.8% of FTWs, with 7.9% reporting daily availability (see Figure 1). 'Hardly any' OC was homemade according to 479 (51.0%) respondents and only 75 (8.0%) reported than 'most' OC was homemade. The most commonly-given reasons for OC availability were occasions such as birthdays/retirements/promotions (n=879:

93.5%), meeting leftovers (n=517: 55.0%), TV/charity events (n=464: 49.4%) and management rewards (n=355: 37.8%) although 390 respondents (41.5%) said no reason was needed. The mode location for OC display was in the main working area (n=666: 70.9%). The mode alternative to OC was fruit (n=441: 46.9%). No alternatives were available for 351 respondents (37.3%).

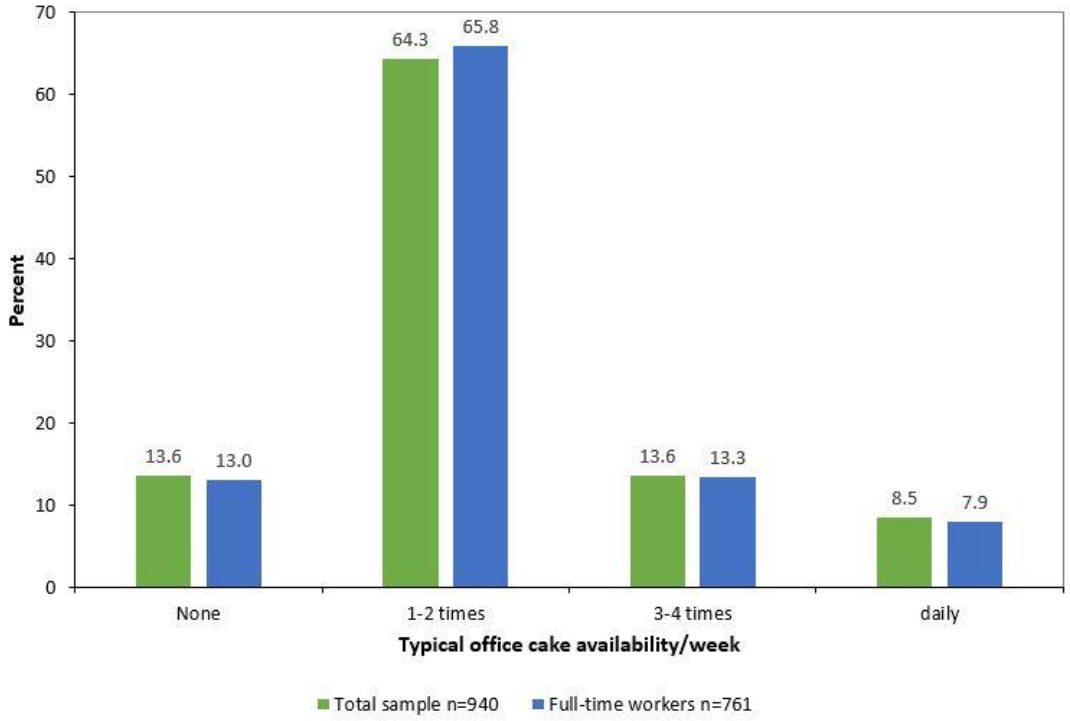


Figure 1: Typical weekly office cake availability: total sample and full time workers

Half (50.5%) of all respondents either strongly disagreed or disagreed that meeting refreshments provided sufficient healthy options with significantly ($p<0.05$) more ≥50s (15.6%) strongly disagreeing than 18-29s (7.6%).

Respondents' own OC behaviour and attitudes

Responses to Likert-type scale items are summarised in Tables 2 and 3.

Among FTWs, the mode frequency (57.8%) of typical personal weekly OC consumption was once-twice/week (Figure 2). The mode number of refusals of an offer of OC (46.6%) by FTWs was 1-3 times/week with 12.6% refusing several times/day. In the condensed analysis, significantly ($p<0.05$) more women (22.0%) than men (13.6%) refused OC at least once/day (Figure 3).

Table 2: Responses from Likert scale items 'Never' to 'Always'

Question	Demographic group	Never n (%)	Sometimes n (%)	About half the time n (%)	Often n (%)	Always n (%)
If OC is available, I eat it	Total Men/Women 18-29/30-49/≥50	76 (8.1)	369 (39.3) (33.7/42.8)[a] (29.7/38.5/47.7)[b]	105 (11.2) (8.4/13.0)[a]	256 (27.2) (32.6/27.9/21.8)[b]	134 (14.3) (21.2/9.9)[a]
I find it easy to refuse OC	Total Men/Women 18-29/30-49/≥50	115 (12.2)	230 (24.45)	119 (12.7)	225 (23.9)	251 (26.7)
I get distracted by the thought, smell or sight of OC	Total Men/Women 18-29/30-49/≥50	360 (38.3) (44.6/34.0)[a]	305 (32.4)	65 (6.9) (4.9/8.3)[a]	151 (16.1)	59 (6.3)
If I refuse OC, colleagues persuade me to change my mind	Total Men/Women 18-29/30-49/≥50	453 (48.2) (57.3/42.1)[a] (40.1/45.4/60.1)[b]	320 (34.0) (26.6/39.1)[a] (32.0/38.3/27.2)[b]	59 (6.3) (11.6/5.2/4.9)[b]	887 (9.3)	21 (2.2)
I feel regret after eating OC	Total Men/Women 18-29/30-49/≥50	356 (37.9)	311 (33.1)	65 (6.9)	134 (14.3)	74 (7.9)
I feel I cause offense if I refuse OC	Total Men/Women 18-29/30-49/≥50	572 (60.9)	217 (23.1) (22.1/20.4/29.2)[b]	41 (4.4)	91 (9.7)	19 (2.0)
It's hard to say no if everyone else is eating OC	Total Men/Women 18-29/30-49/≥50	395 (42.0) (51.1/35.9)[a] (36.6/39.8/50.6)[b]	256 (27.2) (22.6/30.5)[a]	75 (8.0)	151 (16.1) (22.1/16.3/10.7)[b]	63 (6.7)
I feel hurt if OC I've brought to share is refused	Total Men/Women 18-29/30-49/≥50	676 (71.9) (77.7/68.1)[a] (62.2/73.7/75.3)[b]	139 (14.8) (22.1/12.7/14.0)[b]	41 (4.4) (4.7/5.4/1.6)[b]	62 (6.6) (3.8/8.5)[a]	22 (2.3)
I am made to feel uncom-fortable if I refuse OC	Total Men/Women 18-29/30-49/≥50	736 (78.3)	125 (13.3)	44 (4.7)	28 (3.0)	7 (0.7)
I find it hard to resist OC even if not hungry/have just eaten	Total Men/Women 18-29/30-49/≥50	303 (32.2) (37.5/28.7)[a]	286 (30.4) (23.3/30.4/36.2)[b]	85 (9.0) (17.4/8.8/3.7)[b]	168 (17.9)	98 (10.4)
If OC is out of view I am less likely to eat some	Total Men/Women 18-29/30-49/≥50	157 (16.7) (21.7/13.2)[a]	142 (15.1)	95 (10.1)	284 (30.2)	262 (27.9)
I look forward to OC	Total Men/Women 18-29/30-49/≥50	191 (20.3) (23.4/18.0)[a] (12.8/17.3/31.7)[b]	290 (30.9) (26.1/34.2)[a] (22.7/31.2/36.6)[b]	140 (14.9)	177 (18.8) (26.7/19.2/12.3)[b]	142 (15.1) (22.1/16.0/8.2)[b]

OC, office cake

[a]: values differ significantly between genders at $p<0.05$

[b]: values differ significantly between age groups at $p<0.05$

Table 3: Responses from Likert scale items 'Strongly agree' to 'Strongly disagree'

	Demographic groups	Strongly agree n (%)	Agree n (%)	Undecided n (%)	Disagree n (%)	Strongly disagree n (%)
OC has contributed to increase in my weight	Total Men/women 18-29/30-49/≥50	73 (7.8) (5.4/9.3)[a]	221 (23.6) (17.9/27.3)[a] (21.5/27.1/17.3)[b]	174 (18.6)	257 (27.5)	211 (22.5) (28.8/18.5)[a] (20.3/19.8/30.0)[b]
OC has made it harder for me to control my weight	Total Men/women 18-29/30-49/≥50	64 (6.8) (4.3/8.5)[a]	268 (28.6) (24.2/31.5)[a]	122 (13.0)	271 (29.0)	211 (22.5) (30.7/17.3)[a] (22.7/19.6/28.8)[b]
OC makes a weight loss diet harder to stick to	Total Men/women 18-29/30-49/≥50	142 (15.1)	409 (43.5) (36.7/47.9)[a]	103 (11.0) (14.1/8.8)[a]	154 (16.4)	132 (14.0) (17.9/11.4)[a]
OC has made it harder for me to eat healthily	Total Men/women 18-29/30-49/≥50	89 (9.5) (7.1/11.1)[a]	264 (28.1)	136 (14.5)	270 (28.7)	181 (19.3) (25.8/15.0)[a] (16.9/16.5/26.7)[b]
OC is a good thing	Total Men/women 18-29/30-49/≥50	121 (12.9) (17.9/9.7)[a] (19.2/12.1/10.3)[b]	448 (47.7)	208 (22.1)	115 (12.2)	48 (5.1) (1.7/4.6/8.2)[b]
OC is great way to show appreciation	Total Men/women 18-29/30-49/≥50	109 (11.6) (15.5/9.2)[a] (17.4/11.5/7.8)[b]	519 (55.2) (64.5/53.8/51.9)[b]	143 (15.2) (9.3/16.0/17.7)[b]	135 (14.4) (6.4/15.6/17.3)[b]	34 (3.6)
OC brings people together	Total Men/women 18-29/30-49/≥50	161 (17.1) (24.4/17.3/11.5)[b]	596 (63.4)	79 (8.4)	82 (8.7) (3.5/9.6/10.7)[b]	22 (2.3)
OC cheers everyone up	Total Men/women 18-29/30-49/≥50	178 (18.9) (23.1/16.2)[a] (29.7/18.5/11.9)[b]	598 (63.6) (57.9/67.6)[a]	96 (10.2)	53 (5.6)	15 (1.6) (1.2/0.8/3.3)[b]
I would support an initiative to reduce OC consumption	Total Men/women 18-29/30-49/≥50	104 (11.1)	235 (25.0) (20.1/28.2)[a]	278 (29.6)	238 (25.3) (29.1/23.1)[a]	85 (9.0) (12.2/6.9)[a]
I would like my work-place to do more to help my health	Total Men/women 18-29/30-49/≥50	172 (18.3)	317 (33.7) (29.6/36.4)[a]	196 (20.9)	195 (20.7) (16.3/19.8/26.3)[b]	60 (6.4) (8.4/5.1)[a]

OC, office cake

[a]: values differ significantly between genders at $p<0.05$

[b]: values differ significantly between age groups at $p<0.05$

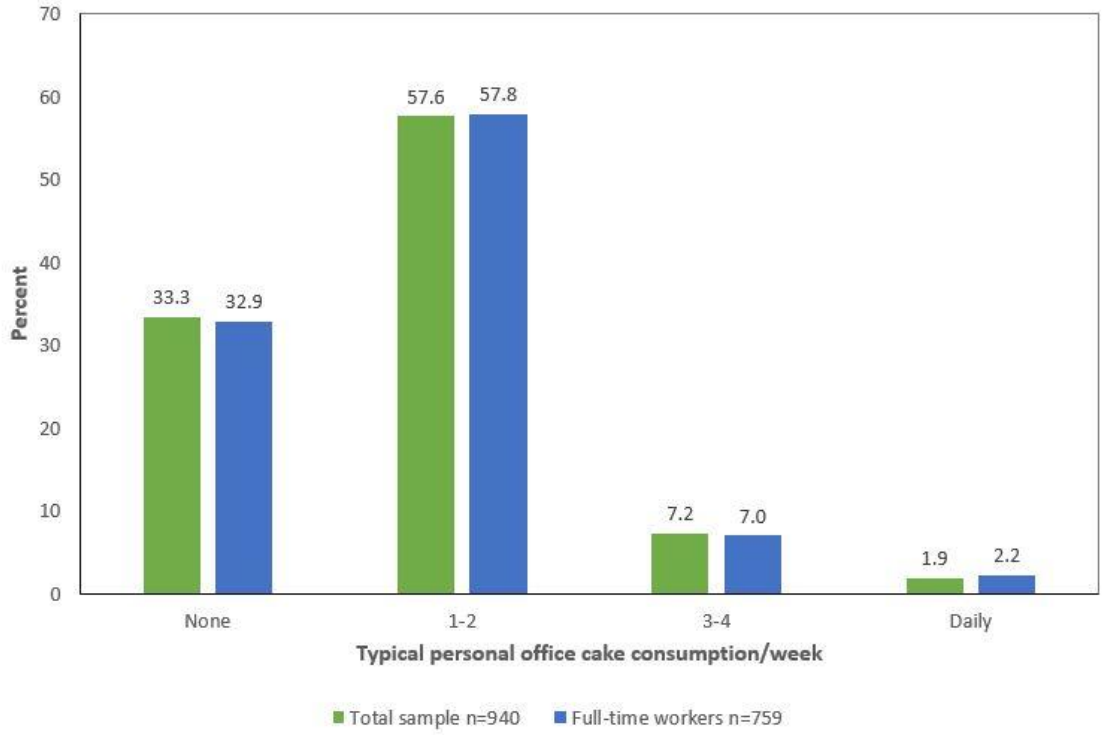


Figure 2: Office cake consumption occasions in a typical week: total sample and full time workers

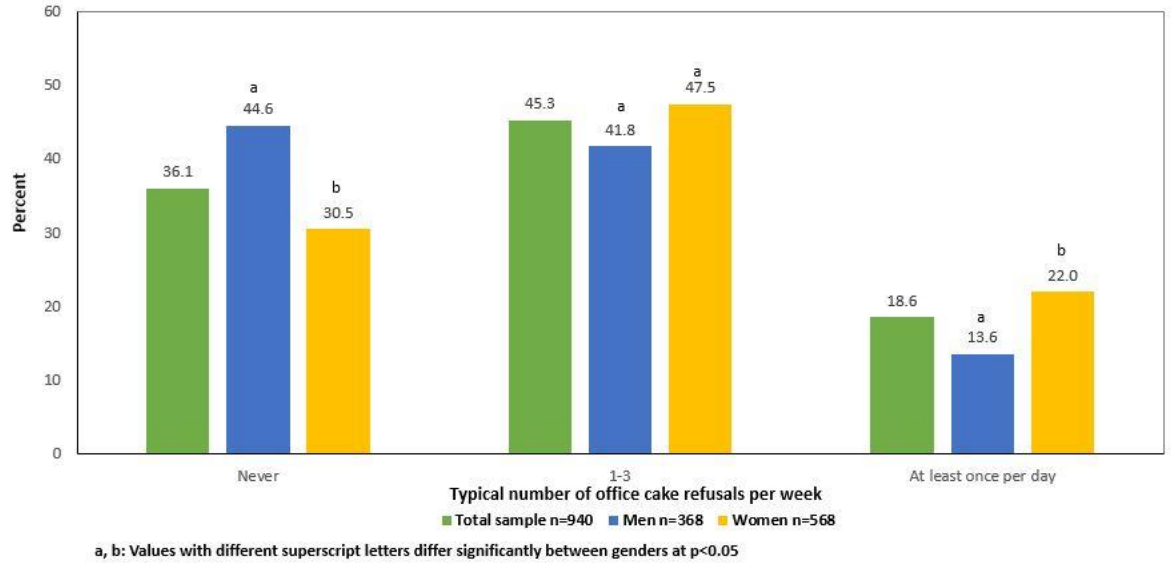
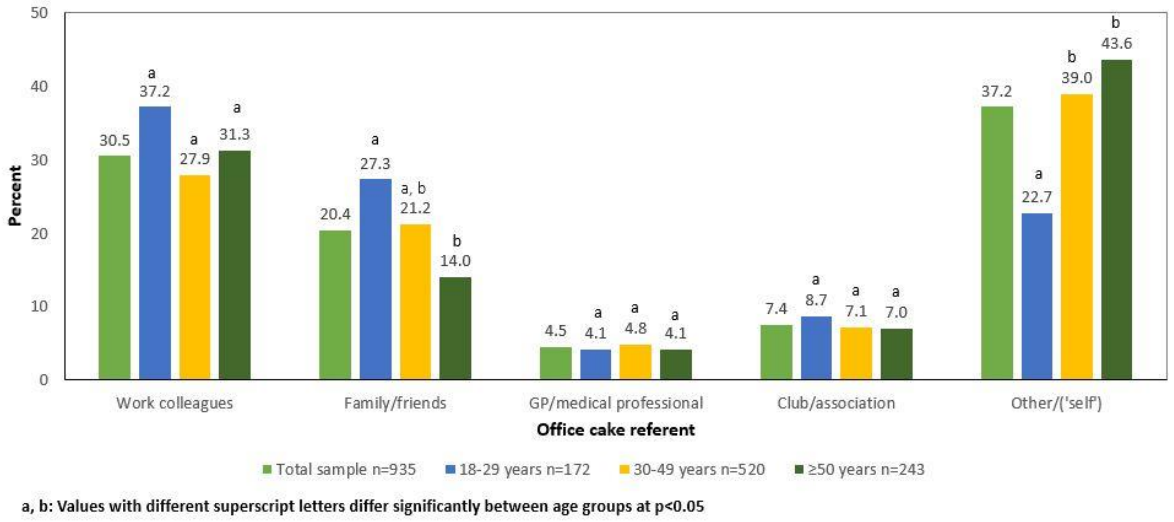


Figure 3: Office cake refusals in a typical week.

TPB/Attitude: For attitude-related items, gender had a significant effect. More respondents either strongly disagreed or disagreed than either strongly agreed or agreed that OC negatively affected weight control and workplace eating. Significantly more women than

men strongly agreed and agreed that OC led to weight gain (36.6% and 23.3% respectively) and made it harder to control bodyweight (40.0% and 28.5% respectively) ($p<0.05$ for all). Significantly ($p<0.05$) more women than men strongly agreed OC made it harder to healthily at work (11.1% and 7.1% respectively). More respondents strongly agreed and agreed (58.6%) than disagreed and strongly disagreed (30.4%) that OC made it harder to stick to a weight loss diet with significantly ($p<0.05$) more women (47.9%) than men (36.7%) agreeing. There were significant trends ($p<0.05$ for all) for fewer women than men, and fewer ≥50s than 18-29s to look forward to OC, and for more women than men to feel regret after eating it.



a, b: Values with different superscript letters differ significantly between age groups at $p<0.05$

Figure 4: Most influential referent according to age group

TPB/Normative behaviour: The mode referent group was 'other' which all but 11 of the 350 respondents (36.1%) defined as 'myself', 'me', 'no one else' or similar. Significantly ($p<0.05$) fewer 18-29s responded other/'self' than either 30-49s or ≥50s (22.7%, 39.0% and 43.6%, respectively), instead citing work colleagues and family/friends (Figure 4). Injunctive norms did not significantly affect OC behaviour. Asked how often respondents felt their refusal of OC offended or caused them (respondents) to feel uncomfortable, or felt hurt if their offer

of OC was refused, the mode response was substantially 'never'. Almost half (48.2%) were never persuaded to change their mind if they refused OC, although significantly ($p<0.05$) more responding 'never' were men (57.3%) than women (42.1%) and of those sometimes persuaded, significantly ($p<0.05$) more were women (39.1%) than men (26.6%). AG had an effect, with significantly ($p<0.05$) fewer ≥50s than 18-29s or 30-49s being persuaded. Over half (58.0%) the respondents reported finding it hard to refuse OC if everyone else is eating it. In the condensed analysis, compared to men, women found it significantly more difficult to refuse sometimes/half the time (29.6% and 39.1% respectively) and often/always (19.3% and 25.0% respectively) ($p<0.05$ for both). In the condensed analysis, significantly ($p<0.05$) more 18-29s (30.2%) than ≥50s (17.3%) said they often/always found it hard to refuse if others are eating it.

TPB/PBC: PBC-related responses suggested OC challenged respondents' self-efficacy. In the condensed analysis of the item 'If OC is available, I eat it', 41.5% responded 'often/always', of which significantly ($p<0.05$) more were men (48.9%) than women (36.6%). However, this was reversed when, of the 50.4% responding 'sometimes' and 'half the time', significantly ($p<0.05$) more were women (55.8%) than men (42.1%). In the condensed analysis significantly ($p<0.05$) more 18-29s than ≥50s reported eating OC 'often/always' if it was available (52.3% and 35.4% respectively). There was a significant ($p<0.05$) trend for women to find it harder than men to resist OC even if they were not hungry or had just eaten a meal, and to be distracted by the sight or thought of OC. Most respondents (83.4%) reported being less likely to eat OC if it was out of view, with significantly ($p<0.05$) more women (61.8%) than men (52.4%) responding 'often/always' in the condensed analysis. Significantly ($p<0.05$) more women (34.9%) than men (23.9%) said they took action to avoid or compensate for OC consumption once-twice/week (Table 4). Of the 54.4% reporting they

never avoided/compensated for OC, significantly (p<0.05) more were men (61.4%) than women (49.8%). There was a trend for more, younger respondents to avoid/compensate for OC consumption more than older respondents. Increased exercise and reduced EI were typical examples of compensatory activities.

Table 4: Action to avoid/compensate for office cake consumption in a typical week

	Never n (%)	1-2 times/week n (%)	3-4 times/week n (%)	≥5 times/week n (%)	Total n (%)
Gender					
Male	226 (61.4)[a]	88 (23.9)[a]	37 (10.1)[a]	17 (4.6)[a]	368 (100)
Female	283 (49.8)[b]	198 (34.9)[b]	55 (9.7)[a]	32 (5.6)[a]	568 (100)
Total	509 (54.4)	286 (30.6)	92 (9.8)	49 (5.2)	936 (100)
Age group					
18-29 years	77 (44.8)[c]	61 (35.5)[c]	27 (15.7)[c]	7 (4.1)[c]	172 (100)
30-49 years	283 (54.4)[c, d]	161 (31.0)[c]	46 (8.8)[d]	30 (5.8)[c]	520 (100)
≥50 years	148 (60.9)[d]	65 (26.7)[c]	18 (7.4)[d]	12 (4.9)[c]	243 (100)
Total	508 (54.3)	287 (30.7)	91 (9.7)	49 (5.2)	935 (100)

a, b: Values with different superscript letters differ significantly between genders at p<0.05
c, d: Values with different superscript letters differ significantly between age groups at p<0.05

Participants' opinions about OC

Most respondents strongly agreed and agreed that 'OC is a good thing', 'OC is a great way to show appreciation', 'OC brings people together' and 'OC cheers everyone up'. With each of these items, significantly (p<0.05 for all) more 18-29s than ≥50s strongly agreed, and for all except 'OC brings people together', significantly (p<0.05 for all) more men than women strongly agreed. Nearly all (94.8%) respondents said the ideal OC frequency was once/week or less. The mode ideal frequency selected was once/month, of which significantly (p<0.05) more were women (47.0%) than men (32.6%) (Table 5). Responses regarding support for a reduction in OC consumption were varied, but the condensed analysis revealed that significantly (p<0.05) more women than men strongly agreed/agreed (38.9% and 31.5%% respectively). Over half (52.0%) strongly agreed or agreed they would like their workplace to do more to promote health and 27.1% disagreed or strongly disagreed. The condensed

analysis revealed a significant ($p<0.05$) trend for more women and younger AGs to strongly agree/agree to more workplace health promotion. The most popular suggested alternative to OC was fruit (n=484: 51.5%), followed by 'cake less often' (n=450: 47.9%) while 16.1% (n=151) said there was no alternative.

Table 5: Ideal office cake frequency

	Never n (%)	Once per month n (%)	Once per fortnight n (%)	Once per week n (%)	Twice per week n (%)	Daily n (%)	Total n (%)
Gender							
Male	28 (7.6)[a]	120 (32.6)[a]	90 (24.5)[a]	104 (28.3)[a]	14 (3.8)[a]	12 (3.3)[a]	368 (100)
Female	29 (5.1)[a]	267 (47.0)[b]	129 (22.7)[a]	120 (21.1)[b]	17 (3.0)[a]	6 (1.1)[b]	568 (100)
Total	57 (6.1)	387 (41.3)	219 (23.4)	224 (23.9)	31 (3.3)	18 (1.9)	936 (100)
Age group							
18-29 years	5 (2.9)[c]	52 (30.2)[c]	53 (30.8)[c]	48 (27.9)[c]	10 (5.8)[c]	4 (2.3)[c]	172 (100)
30-49 years	22 (4.2)[c]	233 (44.8)[d]	121 (23.3)[c, d]	120 (23.1)[c]	14 (2.7)[c]	10 (1.9)[c]	520 (100)
≥50 years	29 (11.9)[d]	102 (42.0)[d]	45 (18.5)[d]	56 (23.0)[c]	7 (2.9)[c]	4 (1.6)[c]	243 (100)
Total	56 (6.0)	387 (41.4)	219 (23.4)	224 (24.0)	31 (3.3)	18 (1.9)	935 (100)

a, b: Values with different superscript letters differ significantly between genders at $p<0.05$
c, d: Values with different superscript letters differ significantly between age groups at $p<0.05$

Discussion

The present study provides the first data on UK OC culture, describing its main characteristics and office workers' attitudes towards it. Two thirds of FTWs typically ate OC at least once/week and in most respondents' workplaces OC was available between one and five times/week. Most OC is shop-bought, is available most commonly to celebrate social occasions, and is displayed on desks/tables in the main office area. OC was generally considered to have positive, morale-boosting characteristics while also having negative consequences such as facilitating weight gain. Almost all respondents said ideal OC availability would be once/week or less but only a third agreed they would welcome an initiative to reduce consumption in their workplace. An important finding was that for most

items exploring OC behaviour, consequences and opinions, gender had a significant effect, and for some items age had a significant effect.

That OC was so widely available aligns with evidence that an increasing proportion of daily EI is from snacks (Kant & Graubard, 2015), cake and sweet baked goods are the primary energy-contributors to snack foods (Duffey et al., 2013; Myhre et al., 2015) and snacking is more likely in the workplace than at home (Liu et al., 2015).

The effects of gender were striking. It is well-established that gender differences exist in food choice and behaviour (Cruwys, Bevelander & Hermans, 2015; Li et al., 2012; Rolls, Federoff & Guthrie, 1991; Wardle, Haase, Steptoe, Nillapun, Jonwuitiwes & Bellisle, 2004). The data relating to TPB/attitudes indicates respondents identified both positive and negative consequences of OC behaviour but more women than men reported being aware of the negative consequences. This is consistent with evidence that women are more likely to avoid energy-dense foods, eat fruit and vegetables, diet to lose weight and value healthy eating (Fagerli & Wandel, 1999; Rolls et al., 1991; Wardle et al., 2004). In contrast, more men than women said they never refused OC and did not acknowledge negative consequences, which aligns with evidence that men have poorer DQ (Wardle et al., 2004), food knowledge (Baker & Wardle, 2003) and less regard for healthy eating behaviours and guidelines (Wardle et al., 2004).

While nearly a third of respondents reported work colleagues were their OC referents, slightly more reported they had no referent other than themselves. This may partially explain why, overall, respondents were not influenced by subjective norms. However, research shows that social modelling influences eating behaviour (Herman, Roth & Polivy, 2003; Vartanian, Spanos, Herman & Polivy, 2015) especially in the workplace (Quist,

Christensen, Carneiro, Hansen & Bjorner, 2014) and among socially-connected people (Christakis & Fowler, 2007; Pachuki, Jacques & Christakis, 2011). Therefore the self-referent respondents could have been demonstrating the third-person effect in which individuals are aware of modelling but deny being affected themselves (Davison, 1983). This has been reported in eating behaviour research (Croker, Whitaker, Cooke & Wardle, 2009; Vartanian, Herman & Wansink, 2008). Because it is recognised that modelling is partly automatic (Cruwys et al., 2015) these individuals may be more influenced by social norms than they realise. An alternative explanation for lack of normative response is that most of the norm-related items investigated injunctive norms, so this finding aligns with evidence indicating injunctive norms are less effective than descriptive norms in influencing eating behaviour (Cruwys et al., 2015; Stok, de Ridder, de Vet & de Wit, 2014). Correspondingly, responses to the item with a descriptive norm component – 'I find it hard to say no to OC if everyone else is eating it' – suggests OC consumption could be influenced by descriptive norms. Interestingly, women's responses indicated they were more influenced than men by injunctive norms, suggesting it is more important to women than men to meet the expectations and approval of others. This is consistent with proposals that women are more likely than men to follow social norms (Bond & Smith, 1996; Eagly & Carli, 1981) and that social modelling effects for eating behaviours are larger among women (Vartanian et al., 2015). Little research exists on gender effects on social eating influences (Higgs, 2015) and the present study points to the need for research in this area.

Data from PBC-related items indicated respondents generally found OC hard to resist. Compared to men, women found it harder to resist OC and were more distracted by it but more women than men reported taking action to avoid or compensate for it. Interestingly, in response to the item 'If OC is available, I eat it', although significantly more women than

men responded ‘sometimes/half the time’, significantly more men than women responded ‘often/always’. These data support research that found women had significantly greater eating-related self-determined motivation (Pelletier, Dion, Slovinec-D’Angel & Reid, 2004; Ryan & Deci, 2000) than men (Leblanc, Begin, Corneau, Dodin & Lemieux, 2014) and higher dietary restraint (Provencher, Drapeau, Tremblay, Despres & Lemieux, 2003; Stunkard & Messick, 1985). This could also provide the mechanism for the present study’s findings that more women than men refused OC more often and compensated more often for OC consumption. Women also generally show higher diet-related disinhibition levels than men (Provencher et al., 2003) which could explain why more women than men reported being distracted by OC and found it hard to resist even if they were not hungry.

No gender difference was found in OC consumption frequency. This was unexpected given the gender-related findings and because evidence suggests, compared to men, women have a higher number of daily eating occasions (Kant & Graubard, 2015) and higher snack frequency (Hartmann et al., 2013; O’Connor et al., 2015). It could be hypothesised that the EI-reducing effects of women’s greater eating-related self-determined motivation, dietary restraint, food knowledge and value for healthy eating behaviours (already discussed) counteract the EI-increasing effects of greater disinhibition and effects of social norms, to the same extent that the opposite could be the case for men. The same factors could explain the gender differences in support for a reduction in OC in the workplace, support for the workplace to do more to improve health, and ideal OC frequency. More research into the effects of gender on non-canteen-based eating behaviour in the workplace, both cross-sectional and longitudinal, is warranted.

Of interest is the discrepancy between almost unanimous support for an ideal OC frequency of once/week or less, and relative lack of support for interventions to achieve such low OC consumption levels. The gender effect could partially explain this. Another explanation could relate to commensality (Kerner, Chou & Warmind, 2015) which is associated with improved cooperation and performance among workgroups (Kniffin, Wansink, Devine & Sobal, 2015), cooperation and trust (Allen-Arave, Gurven & Hill, 2008; Mameli, 2013) and connection between eating companions (Alley, 2012; Kniffin & Wansink, 2012). Identification of the positive, morale-boosting consequences of OC (OC is a good thing, brings people together and cheers everyone up) could have arisen from respondents' subliminal recognition of the effects of commensality while simultaneously recognising OC's negative, diet- and weight-related consequences. This merits further investigation.

There was an age effect for some items, particularly those investigating opinions on OC's morale-boosting attributes and TPB/PBC. 18-29s approved of OC, found it hard to resist and compensated for OC consumption significantly more than ≥50s. Data on the effects of age on eating behaviour are scarce but the present study's findings are consistent with three studies using the Three-Factor Eating Questionnaire (Stunkard & Messick, 1985) that found restraint scores increased and/or disinhibition and hunger scores decreased with increasing age (Drapeau, Provencher, Lemieux, Despres, Bouchard, Tremblay, 2003; Harden, Corfe, Richardson, Dettmar & Paxman, 2009; Loffler et al., 2015). Additionally, a cross-sectional study that found healthy eating knowledge and positive feelings resulting from healthy eating increased with age (Jovičić, 2015) might help explain the present study's age-related findings. Evidently age may affect eating behaviour in a range of settings including the workplace and more research is needed.

Several items related to the effects of environmental factors on OC consumption. For 71% respondents OC was displayed on a table/desk in the main office and nearly all reported if OC is available they eat it, suggesting an OC display prompts consumption. Additionally, a majority of respondents reported being distracted by the thought or sight of OC which is consistent with evidence that the thought, sight or smell of palatable food stimulates hunger and motivation to eat (Ferriday & Brunstrom, 2011; Ramaekers, Boesveldt, Lakemond, van Boekel & Luning, 2014). Relatedly, nearly all respondents said they were less likely to eat OC if it is out of view, which is consistent with evidence that consumption decreases if food is further away or more inaccessible (Maas, de Ridder, de Vet & de Wit, 2012; Meiselman, Hedderley, Staddon, Pierson & Symonds, 1994; Rozin, Scott, Dingley, Urbanek, Jiang & Kaltenbach, 2011) including in the workplace (Painter, Wansink & Hieggelke, 2002; Wansink, Painter & Lee, 2006). Research found habitual disinhibition was the strongest behavioural correlate with weight gain in older women (Hays & Roberts, 2008), so a regular OC display may create conditions in which individuals, particularly women, habitually respond by eating cake. Additionally, an environment where OC consumption is common is likely to create opportunities for descriptive normative behaviour and social modelling to reinforce OC consumption (Cruwys et al., 2015). Combined with evidence that WHPPs with an environmental component are more effective and sustainable than targeting at-risk individuals (Donohoe Mather & McGurk, 2014; Malik et al., 2014), these findings support nudge theory's premise that choice architecture to make OC less visible, accessible or frequently-available would reduce OC consumption without relying on employees self-efficacy (Mela, 2006; Thaler & Sunstein, 2009 Wansink, 2010; Wansink & Chandon, 2014). Research is warranted.

Over half the respondents reported OC made it harder to eat healthily at work which is consistent with findings from workplace research involving young adults (Watts et al., 2015). However, Watts et al. found no correlation between availability of sweets/snacks and DQ or adiposity. This might be because the participants were young adults who, in common with the 18-29s in the present study, could have been more likely to compensate for sweets/snacks consumption to control weight gain. Similarly the present study found no association between BMI and either OC availability or consumption although it was not designed to investigate this. Nonetheless, almost a third of respondents reported OC had contributed to weight gain. This is consistent with evidence that cake and sweet baked goods are the primary energy-contributors to snacks food (Duffey et al., 2013; Myhre et al., 2015; Ovaskainen et al., 2006; Piernas & Popkin, 2006) and that snacks are associated with added sugar consumption (Louie & Rangan, 2016; Myhre et al., 2015; Ovaskainen et al., 2006) which is strongly associated with obesity (SACN, 2015). Research to investigate links between OC and obesity would be worthwhile.

Strengths/limitations

The present study has strengths and limitations. It supplies the first data on the well-recognised but poorly-understood OC phenomenon. However, data accuracy could have been affected by the questionnaire being non-validated with self-reported responses. The sampled population, although not technically representative (O'Leary, 2014) of UK office workers, was large enough to provide significant results. Unlike many studies investigating obesity and eating-related behaviour, 40% of the participants were male which improved the representative quality of the sample and adds to the literature on the effect of gender on eating behaviours. The social media-based recruitment strategy may have been subject

to response bias. Only office workers were investigated so results may not be applicable to other workplace environments. This study contributes to the literature on the effects of gender and age on social influences on eating behaviour, although insufficient descriptive norm items were included and some items were not optimally operationalised.

Avenues for future research include developing and validating the questionnaire to expand the present study's findings, adding items to investigate the effect of descriptive norms and explore the effects of age and gender on social influence on workplace snacking behaviour. Validation of versions to explore cake culture in other sectors such as the National Health Service where obesity prevalence is high (Blake, Zhou & Batt, 2016; Kyle, Nealle & Atherton, 2016) would be beneficial. Research using a validated instrument such as the Three-factor Eating Questionnaire (Stunkard & Messick, 1985) to further explore the effects of age and gender on OC behaviour would be informative as would investigation of the effects on OC behaviour of choice architectural changes to workplace environments. Exploration of the perceived positive effects of OC would be valuable.

Conclusion

UK OC consumption has characteristics which influence the workplace eating environment and employee eating behaviour and therefore could affect WHPP efficacy. Attitudes of office workers towards OC vary and are significantly affected by gender and AG. Accordingly, WHPP designers should recognise the existing gender and age profile. Use of choice architectural techniques to effect environmental change might be useful in reducing OC consumption.

List of references

Alford, S. (2013). Survey Research. In McIntosh, A., Mason, T., Mason-Whitehead, E., & Coyle, D (Eds.), *Key concepts in nursing and healthcare research (*pp 153 -158). London: Sage Publications. Retrieved from http://www.dawsonera.com

Allan, J., Querstret, D., Banas, K., & Bruin, M. (2017). Environmental interventions for altering eating behaviours of employees in the workplace: A systematic review. *Obesity Reviews, 18*(2), 214-226. doi:10.1111/obr.12470

Allen-Arave, W., Gurven, M., & Hill, K. (2008). Reciprocal altruism, rather than kin selection, maintains nepotistic food transfers on an ache reservation. *Evolution and Human Behavior, 29*(5), 305-318. doi:10.1016/j.evolhumbehav.2008.03.002

Alley, T. R. (2012). Contaminated and uncontaminated feeding influence perceived intimacy in mixed-sex dyads. *Appetite, 58*(3), 1041. doi:10.1016/j.appet.2012.02.049

Anderson, L. M., Quinn, T. A., Glanz, K., Ramirez, G., Kahwati, L. C., Johnson, D. B., … Task Force on Community Preventive Services. (2009). The effectiveness of worksite nutrition and physical activity interventions for controlling employee overweight and obesity: A systematic review. *American Journal of Preventive Medicine, 37*(4), 340.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organisational Behavior and Human Decsion Processes*, 50: 1 79-211

Ajzen, I. (2005). *Attitudes, personality and behavior* (2nd ed.). Maidenhead: Open University Press.

Ajzen, 1. (2011). The Theory of Planned Behavior: Reactions and reflections. *Psychology & Health*, 26(9), 1113. doi: 10.1080/0887044 6.2011.613995

Baker, A. H., & Wardle, J. (2003). Sex differences in fruit and vegetable intake in older adults. *Appetite, 40*(3), 269-275. doi:10.1016/S0195-6663(03)00014-X

Ball, K., Jeffery, R. W., Abbott, G., McNaughton, S. A., & Crawford, D. (2010). Is healthy behavior contagious: Associations of social norms with physical activity and healthy eating. *The International Journal of Behavioral Nutrition and Physical Activity, 7*(1), 86-86. doi:10.1186/1479-5868-7-86

Black, C. (2008). *Working for a healthier tomorrow.* Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209782/hwwb-working-for-a-healthier-tomorrow.pdf

Blake, H., Zhou, D., & Batt, M. E. (2013). Five-year workplace wellness intervention in the NHS. *Perspectives in Public Health, 133*(5), 262-271. doi:10.1177/1757913913489611

Bond, M. H., & Smith, P. B. (1996). Cross-cultural social and organizational psychology. *Annual Review of Psychology, 47*, 205

Bowling, A. (2005). Mode of questionnaire administration can have serious effects on data quality. *Journal of Public Health (Oxford, England), 27*(3), 281-291. doi:10.1093/pubmed/fdi031

Christakis, N. A., & Fowler, J. H. (2007). The spread of obesity in a large social network over 32 years. *The New England Journal of Medicine, 357*(4), 370-379. doi:10.1056/NEJMsa066082

Croker, H., Whitaker, K. L., Cooke, L., & Wardle, J. (2009). Do social norms affect intended food choice? *Preventive Medicine, 49*(2), 190-193. doi:10.1016/j.ypmed.2009.07.006

Cruwys, T., Bevelander, K. E., & Hermans, R. C. J. (2015). Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite, 86*, 3-18. doi:10.1016/j.appet.2014.08.035

Davison, W. P. (1983). The third-person effect in communication. *The Public Opinion Quarterly, 47*(1), 1-15. doi:10.1086/268763

Donohoe Mather, C. M., & McGurk, M. D. (2014). Insights in public health: Promoting healthy snack and beverage choices in Hawai'i worksites: The choose healthy now! Pilot project. *Hawai'i Journal of Medicine & Public Health: A Journal of Asia Pacific Medicine & Public Health, 73*(11), 365.

Drapeau, V., Provencher, V., Lemieux, S., Després, J., Bouchard, C., & Tremblay, A. (2003). Do 6-y changes in eating behaviors predict changes in body weight? Results from theQquébec family study. *International Journal of Obesity, 27*(7), 808-814. doi:10.1038/sj.ijo.0802303

Duffey, K. J., Pereira, R. A., & Popkin, B. M. (2013). Prevalence and energy intake from snacking in Brazil: Analysis of the first nationwide individual survey. *European Journal of Clinical Nutrition, 67*(8), 868. doi:10.1038/ejcn.2013.60

Duffey, K. J., & Popkin, B. M. (2011). Energy density, portion size, and eating occasions: Contributions to increased energy intake in the United States, 1977-2006. *PLoS Medicine, 8*(6), e1001050. doi:10.1371/journal.pmed.1001050

Eagly, A. H., & Carli, L. L. (1981). Sex of researchers and sex-typed communications as determinants of sex differences in influenceability: A meta-analysis of social influence studies. *Psychological Bulletin, 90*(1), 1-20. doi:10.1037//0033-2909.90.1.1

Engbers, L. H., van Poppel, M. N. M., Chin A Paw, Marijke J.M, & van Mechelen, W. (2005). Worksite health promotion programs with environmental changes. *American Journal of Preventive Medicine, 29*(1), 61-70. doi:10.1016/j.amepre.2005.03.001

Fan, W., & Yan, Z. (2010). Factors affecting response rates of the web survey: A systematic review. *Computers in Human Behavior, 26*(2), 132-139. doi:10.1016/j.chb.2009.10.015

Fagerli, R. A., & Wandel, M. (1999). Gender differences in opinions and practices with regard to a "healthy diet". *Appetite, 32*(2), 171-190. doi:10.1006/appe.1998.0188

Ferriday, D., & Brunstrom, J. M. (2011). 'I just can't help myself': Effects of food-cue exposure in overweight and lean individuals. *International Journal of Obesity (2005), 35*(1), 142.

Fitzgerald, S., Geaney, F., Kelly, C., McHugh, S., & Perry, I. J. (2016). Barriers to and facilitators of implementing complex workplace dietary interventions: Process evaluation results of a cluster controlled trial. *BMC Health Services Research, 16*, 139. doi:10.1186/s12913-016-1413-7

Harden, C. J., Corfe, B. M., Richardson, J. C., Dettmar, P. W., & Paxman, J. R. (2009). Body mass index and age affect three-factor eating questionnaire scores in male subjects. *Nutrition Research, 29*(6), 379-382. doi:10.1016/j.nutres.2009.04.001

Hartmann, C., Siegrist, M., & van der Horst, K. (2013). Snack frequency: Associations with healthy and unhealthy food choices. *Public Health Nutrition, 16*(8), 1487. doi:10.1017/S1368980012003771

Hays, N. P., & Roberts, S. B. (2008). Aspects of eating behaviors "disinhibition" and "restraint" are related to weight gain and BMI in women. *Obesity, 16*(1), 52-58. doi:10.1038/oby.2007.12

Health Survey for England. (2015). *Table 2: Height, weight and body mass index (BMI), overweight and obesity prevalence, by sex and age.* Downloaded from: http://healthsurvey.hscic.gov.uk/support-guidance/public-health/health-survey-for-england-2015/adult-overweight-and-obesity.aspx

Herman, C. P., Roth, D. A., & Polivy, J. (2003). Effects of the presence of others on food intake: A normative interpretation. *Psychological Bulletin, 129*(6), 873-886. doi:10.1037/0033-2909.129.6.873

Higgs, S. (2015). Social norms and their influence on eating behaviours. *Appetite, 86*, 38-44. doi:10.1016/j.appet.2014.10.021

Hoonakker, P., & Carayon, P. (2009). Questionnaire survey nonresponse: A comparison of postal mail and internet surveys. *International Journal of Human-Computer Interaction, 25*(5), 348-373. doi:10.1080/10447310902864951

Jovičić, A. Đ. (2015). Healthy eating habits among the population of Serbia: Gender and age differences. *Journal of Health, Population, and Nutrition, 33*(1), 76.

Kant, A. K., & Graubard, B. I. (2015). 40-year trends in meal and snack eating behaviors of American adults. *Journal of the Academy of Nutrition and Dietetics, 115*(1), 50-63. doi:10.1016/j.jand.2014.06.354

Kerner, S., Chou, C., & Warmind, M. (2015). *Commensality. From everyday food to feast.* London: Bloomsbury

Kniffin, K. M., & Wansink, B. (2012). It's not just lunch: Extra-pair commensality can trigger sexual jealousy: E40445. *PLoS One, 7*(7) doi:10.1371/journal.pone.0040445

Kniffin, K. M., Wansink, B., Devine, C. M., & Sobal, J. (2015). Eating together at the firehouse: How workplace commensality relates to the performance of firefighters. *Human Performance, 28*(4), 281-306. doi:10.1080/08959285.2015.1021049

Kyle, R. G., Neall, R. A., & Atherton, I. M. (2016). Prevalence of overweight and obesity among nurses in Scotland: A cross-sectional study using the Scottish health survey. *International Journal of Nursing Studies, 53*, 126-133. doi:10.1016/j.ijnurstu.2015.10.015

Leblanc, V., Bégin, C., Corneau, L., Dodin, S., & Lemieux, S. (2015). Gender differences in dietary intakes: What is the contribution of motivational variables? *Journal of Human Nutrition and Dietetics, 28*(1), 37-46. doi:10.1111/jhn.12213

Leech, R. M., Worsley, A., Timperio, A., & McNaughton, S. A. (2015). Understanding meal patterns: Definitions, methodology and impact on nutrient intake and diet quality. *Nutrition Research Reviews, 28*(1), 1-21. doi:10.1017/S0954422414000262

Li, K., Concepcion, R. Y., Lee, H., Cardinal, B. J., Ebbeck, V., Woekel, E., & Readdy, R. T. (2012). An examination of sex differences in relation to the eating habits and nutrient intakes of university students. *Journal of Nutrition Education and Behavior, 44*(3), 246. doi:10.1016/j.jneb.2010.10.002

Liu, J. L., Han, B., & Cohen, D. A. (2015). Associations between eating occasions and places of consumption among adults. *Appetite, 87*, 199-204. doi:10.1016/j.appet.2014.12.217

Löffler, A., Luck, T., Then, F. S., Luppa, M., Sikorski, C., Kovacs, P., … Riedel-Heller, S. G. (2015). Age- and gender-specific norms for the german version of the three-factor eating-questionnaire (TFEQ). *Appetite, 91*, 241-247. doi:10.1016/j.appet.2015.04.044

Louie, J. C. Y., & Rangan, A. M. (2016). Patterns of added sugars intake by eating occasion among a nationally representative sample of Australians. *European Journal of Nutrition,* doi:10.1007/s00394-016-1303-0

Maas, J., de Ridder, D. T. D., de Vet, E., & de Wit, J. B. F. (2012). Do distant foods decrease intake? The effect of food accessibility on consumption. *Psychology & Health, 27*(sup2), 59-73. doi:10.1080/08870446.2011.565341

Mackison, D., Mooney, J., Macleod, M., & Anderson, A. S. (2016). Lessons learnt from a feasibility study on price incentivised healthy eating promotions in workplace catering establishments. *Journal of Human Nutrition and Dietetics, 29*(1), 86-94. doi:10.1111/jhn.12283

Maes, L., Van Cauwenberghe, E., Van Lippevelde, W., Spittaels, H., De Pauw, E., Oppert, J., … De Bourdeaudhuij, I. (2012). Effectiveness of workplace interventions in Europe

promoting healthy eating: A systematic review. *European Journal of Public Health, 22*(5), 677-683. doi:10.1093/eurpub/ckr098

Malik, S. H., Blake, H., & Suggs, L. S. (2014). A systematic review of workplace health promotion interventions for increasing physical activity. *British Journal of Health Psychology, 19*(1), 149-180. doi:10.1111/bjhp.12052

Mameli, M. (2013). Meat made us moral: A hypothesis on the nature and evolution of moral judgment. *Biology & Philosophy, 28*(6), 903-931. doi:10.1007/s10539-013-9401-3

Marteau, T. M., Hollands, G. J., & Fletcher, P. C. (2012). Changing human behavior to prevent disease: The importance of targeting automatic processes. *Science (New York, N.Y.), 337*(6101), 1492.

Mattke, S., Liu, H., Caloyeras, J., Huang, C., van Busum, K., Khodyakov, D. & Shier, V. (2013). *Workplace wellness programs study. Final report*. Downloaded from: http://www.rand.org/content/dam/rand/pubs/research_reports/RR200/RR254/RAND_RR254.sum.pdf

McCrory, M. A., Howarth, N. C., Roberts, S. B., & Huang, T. T. (2011). Eating frequency and energy regulation in free-living adults consuming self-selected diets. *The Journal of Nutrition, 141*(1), 148-153. doi:10.3945/jn.109.114991

McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the theory of planned behaviour: A meta-analysis. *Health Psychology Review, 5*(2), 97-48. doi:10.1080/17437199.2010.521684

Meiselman, H. L., Hedderley, D., Staddon, S. L., Pierson, B. J., & Symonds, C. R. (1994). Effect of effort on meal selection and meal acceptability in a student cafeteria. *Appetite, 23*(1), 43

Mela, D. J. (2006). Eating for pleasure or just wanting to eat? Reconsidering sensory hedonic responses as a driver of obesity. *Appetite, 47*(1), 10-17. doi:10.1016/j.appet.2006.02.006

Mooney, J. D., Frank, J., & Anderson, A. S. (2013). Workplace dietary improvement initiatives ought not to be discouraged by modest returns from low-intensity interventions. *European Journal of Public Health, 23*(2), 193.

Murakami, K., & Livingstone, M. B. E. (2016a). Energy density of meals and snacks in the British diet in relation to overall diet quality, BMI and waist circumference: Findings from the national diet and nutrition survey. *British Journal of Nutrition, 116*(8), 1479-1489. doi:10.1017/S0007114516003573

Murakami, K., & Livingstone, M. B. E. (2016b). Associations between meal and snack frequency and diet quality and adiposity measures in British adults: Findings from the National Diet and Nutrition Survey. *Public Health Nutrition, 19*(9), 1624-11. doi:10.1017/S1368980015002979

Myhre, J. B., Løken, E. B., Wandel, M., & Andersen, L. F. (2015). The contribution of snacks to dietary intake and their association with eating location among Norwegian adults - results from a cross-sectional dietary survey. *BMC Public Health, 15*(1), 369. doi:10.1186/s12889-015-1712-7

NCD Risk Factor Collaboration. (2016). Trends in adult body-mass index in 200 countries from 1975 to 2014: A pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *The Lancet, 387*(10026), 1377. Retrieved from https://search.proquest.com/docview/1780215939/fulltextPDF/BEF3DDF6CEF741DCPQ/1?accountid=14620

Nicklas, T. A., O'Neil, C. E., & Fulgoni III, V. L. (2014). Snacking patterns, diet quality, and cardiovascular risk factors in adults. *BMC Public Health, 14*(1), 388-388. doi:10.1186/1471-2458-14-388

O'Connor, L., Brage, S., Griffin, S. J., Wareham, N. J., & Forouhi, N. G. (2015). The cross-sectional association between snacking behaviour and measures of adiposity: The Fenland study, UK. *The British Journal of Nutrition, 114*(8), 1286. doi:10.1017/S000711451500269X

Office for National Statistics. (2016). *EMP04: Employment by occupation*. Retrieved from https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/employmentbyoccupationemp04

O'Leary, Z. (2014). *The essential guide to doing your research project* (Second ed.). London: SAGE.

Ovaskainen, M., Reinivuo, H., Tapanainen, H., Hannila, M., Korhonen, T., & Pakkala, H. (2006). Snacks as an element of energy intake and food consumption. *European Journal of Clinical Nutrition, 60*(4), 494-501. doi:10.1038/sj.ejcn.1602343

Pachucki, M. A., Jacques, P. F., & Christakis, N. A. (2011). Social network concordance in food choice among spouses, friends, and siblings. *American Journal of Public Health, 101*(11), 2170-2177. doi:10.2105/AJPH.2011.300282

Painter, J. E., Wansink, B., & Hieggelke, J. B. (2002). How visibility and convenience influence candy consumption. *Appetite, 38*(3), 237-238. doi:10.1006/appe.2002.0485

Pelletier, L. G., Dion, S. C., Slovinec-D'Angelo, M., & Reid, R. (2004). Why do you regulate what you eat? Relationships between forms of regulation, eating behaviors, sustained dietary behavior change, and psychological adjustment. *Motivation and Emotion, 28*(3), 245-277. doi:10.1023/B:MOEM.0000040154.40922.14

Piernas, C., & Popkin, B. M. (2010). Snacking increased among U.S. adults between 1977 and 2006. *The Journal of Nutrition, 140*(2), 325-332. doi:10.3945/jn.109.112763

Popkin, B. M., & Duffey, K. J. (2010). Does hunger and satiety drive eating anymore? Increasing eating occasions and decreasing time between eating occasions in the United States. *The American Journal of Clinical Nutrition, 91*(5), 1342-1347. doi:10.3945/ajcn.2009.28962

Provencher, V., Drapeau, V., Tremblay, A., Després, J., & Lemieux, S. (2003). Eating behaviors and indexes of body composition in men and women from the Québec family study. *Obesity Research, 11*(6), 783-792. doi:10.1038/oby.2003.109

Public Health England. (2017). *About obesity*. Downloaded on 19 June 2017 from http://webarchive.nationalarchives.gov.uk/20170210161227/http://www.noo.org.uk/NOO_about_obesity

Quist, H. G., Christensen, U., Carneiro, I. G., Hansen, J. V., & Bjorner, J. B. (2014). Do colleagues influence our lifestyle: The matter of smoking, body mass index and leisure-time physical activity? *Preventive Medicine, 67*, 166-170. doi:10.1016/j.ypmed.2014.07.032

Ramaekers, M. G., Boesveldt, S., Lakemond, C. M., van Boekel, M. A., & Luning, P. A. (2014). Odors: Appetizing or satiating? Development of appetite during odor exposure over time. *International Journal of Obesity (2005), 38*(5), 650.

Rolls, B. J., Fedoroff, I. C., & Guthrie, J. F. (1991). Gender differences in eating behavior and body weight regulation. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association, 10*(2), 133-142. doi:10.1037/0278-6133.10.2.133

Royal College of Surgeons. (2016). *Position statement. Combatting cake culture: reducing excessive sugar consumption in the workplace.* Downloaded from http://FDS%20position%20statement%20%20Cake%20Culture%20FINAL%20(4).pdf

Rozin, P., Scott, S., Jiang, H., Dingley, M., Urbanek, J. K., & Kaltenbach, M. (2011). Nudge to nobesity I: Minor changes in accessibility decrease food intake. *Judgment and Decision Making, 6*(4), 323-332.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78. doi:10.1037/0003-066X.55.1.68

Scientific Advisory Committee on Nutrition. (2015). *Carbohydrates and Health*. Retrieved from

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf

Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health, 27*, 297.prin

Salmon, S. J., Fennis, B. M., Ridder, D. T. D., Aiaanse, M. A., & de Vet, E. (2014). Health on impulse: When low self-control promotes healthy food choices. *Health Psychology, 33*(2), 103-109. doi:10.1037/a0031785

Sedgwick, P. (2013). Snowball sampling. *BMJ, 347*(dec20 2), f7511-f7511. doi:10.1136/bmj.f7511

Sedgwick, P. (2014). Cluster sampling. *BMJ, 348*(jan31 2), g1215-g1215. doi:10.1136/bmj.g1215

Stok, F. M., De Ridder, D. T. D., De Vet, E., & De Wit, J. B. F. (2014). Don't tell me what I should do, but what others do: The influence of descriptive and injunctive peer norms on fruit consumption in adolescents. *British Journal of Health Psychology, 19*(1), 52-64. doi:10.1111/bjhp.12030

Stunkard, A. J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research, 29*(1), 71.

Swinburn, B. A., Sacks, G., Hall, K. D., McPherson, K., Finegood, D. T., Moodie, M. L., & Gortmaker, S. L. (2011). Obesity 1: The global obesity pandemic: Shaped by global drivers and local environments. *The Lancet, 378*(9793), 804

Tabak, R. G., Hipp, J. A., Marx, C. M., & Brownson, R. C. (2015). Workplace social and organizational environments and healthy-weight behaviors: E0125424. *PLoS One, 10*(4) doi:10.1371/journal.pone.0125424

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth and happiness* (New international ed.). London: Penguin

Vartanian, L. R., Herman, C. P., & Wansink, B. (2008). Are we aware of the external factors that influence our food intake? *Health Psychology, 27*(5), 533-538. doi:10.1037/0278-6133.27.5.533

Vartanian, L. R., Spanos, S., Herman, C. P., & Polivy, J. (2015). Modeling of food intake: A meta-analytic review. *Social Influence, 10*(3), 119-136. doi:10.1080/15534510.2015.1008037

Wansink, B. (2010). From mindless eating to mindlessly eating better. *Physiology & Behavior, 100*(5), 454-463. doi:10.1016/j.physbeh.2010.05.003

Wansink, B., & Chandon, P. (2014). Slim by design: Redirecting the accidental drivers of mindless overeating. *Journal of Consumer Psychology,* doi:10.1016/j.jcps.2014.03.006

Wansink, B., Painter, J. E., & Lee, Y. (2006). The office candy dish: Proximity's influence on estimated and actual consumption. *International Journal of Obesity, 30*(5), 871-875. doi:10.1038/sj.ijo.0803217

Wardle, J., Haase, A. M., Steptoe, A., Nillapun, M., Jonwutiwes, K., & Bellisie, F. (2004). Gender differences in food choice: The contribution of health beliefs and dieting. *Annals of Behavioral Medicine, 27*(2), 107-116. doi:10.1207/s15324796abm2702_5

Watts, A. W., Laska, M. N., Larson, N. I., & Neumark-Sztainer, D. R. (2016). Millennials at work: Workplace environments of young adults and associations with weight-related health. *Journal of Epidemiology and Community Health, 70*(1), 65-71. doi:10.1136/jech-2015-205782

Zoellner, J., Estabrooks, P. A., Davy, B. M., Chen, Y. & You, W. (2012). Exploring the theory of planned behavior to explain sugar-sweetened beverage consumption. *Journal of Nutrition Education and Behavior, 44*(2), 172-177. doi:10.1016/j.jneb.2011.06.010

Appendix 1

Office Cake questionnaire: item sources and rationales

Item	Item type	Item text	Source	Purpose/rationale
Section 1: Questions about cake culture in your workplace				
1	Multiple choice (MC): single answer	In a typical working week, on how many occasions are cakes available in your office?	Adapted from Healthy Eating Vital Signs assessment tool (HEVS) [(1)]	Estimate office cake (OC) prevalence. Validation indicated that items focussing on typical behaviour more likely to ID at-risk behaviour than 1 day/1wk recall [(2)]. Also, 'frequency' better than 'servings' [(1)]
2	MC: single answer	How often is there a regular occasion when there is always cake available in your office? *Examples given*.	In response to informal survey	ID OC occasion regularity.
3	MC, single answer	Typically, who are the main providers of office cake?	In response to informal survey	ID main providers.
4	MC, all that apply	Which occasions lead to OC availability? (list)	In response to informal survey	ID main reasons for OC
5	MC: single answer	Typically in your office, where are OCs displayed?	In response to informal survey	ID range of storage/display sites and proximity hypothesis [(3)]
6	MC: all that apply	Are alternatives to cake ever provided? List.	In response to informal survey and Royal College of Surgeons (RCS) position statement [(4)]	Understand whether alternatives present
7	MC: single answer	Thinking about your office in a typical month, please estimate proportion of OC that are home-made	In response to informal survey and supplied photos of OC, most of which were not homemade. See Q1	Investigate the Great British Bake Off effect. Home-made cakes could be healthier – fewer transfats etc
8	5 point Likert Scale (LS): SA, A, U, D, SD	Thinking about your own workplace, please state to what extent you agree/disagree with the following statement: refreshments for meetings offer enough healthy options	In response to informal survey response: '…trapped in a meeting with only unhealthy biscuits/sweets…'	ID one potential quick win to improve workplace eating environment. 5 –point Likert scale preferred by women for healthy eating questionnaire [(5)]

Item	Item type	Item text	Source	Purpose/rationale
9	MC: all that apply	Which of the following 'wellbeing at work' initiatives does your workplace offer? (list).		Enable exploration of relationship between OC behaviour and workplace health initiatives
Section 2: Questions about your own office cake consumption				
10	MC: single answer	In a typical week, on how many occasions do you personally eat cake? 4 options: 0, 1-2, 3-4, 5 or more	Adapted from HEVS	Establish personal level of OC consumption, per week. See Q1 rationale.
11	MC: single answer	In a typical week, how often do you turn down office cake when it is offered to you?	Adapted from Weight Efficacy Lifestyle Q (WEL)[6] items 3,12,13,17, 18	Explore Theory of Planned Behaviour (TPB)[7]: perceived behavioural control (PBC)/self-efficacy
12a	5 point LS: Never, Some-times, About half the time, Often, Always	If there is cake available, I eat it.	Adapted from Weight-Related EQ (WREQ) item 5 [8]	Explore TPB/PBC self-efficacy. Explore proximity hypothesis [3]
b		I find it easy to refuse cake if I don't want one	Adapted from WEL items 7 & 17.	TPB: PPC self-efficacy
c		If there is cake in the office I get distracted by the smell, sight or thought of it	In response to informal survey; adapted from Food Preoccup-ation Q (FPQ)[9] items 1, 3, 11	TPB: PCB barriers. Explore proximity hypothesis
d		If I've initially refused cake, my colleagues persuade me to change my mind	Adapted from WEL item 13	TPB: Subjective Norms (SN) - injunctive
e		I feel regret after eating OC	In response to informal survey	TPB: Attitude – outcome evaluation
f		If feel I cause offence or hurt someone's feelings if I refuse cake	Adapted from WEL items 1, 8 & 18	TPB: SN - injunctive
g		It's hard to say no to OC if everyone else is eating it	Adapted from WREQ item 8.	TPB: SN – descriptive
h		I feel hurt if someone refuses cake I've brought in to share		TPB: SN - injunctive
i		I am made to feel uncomfortable by colleagues when I turn down an offer of cake	Adapted from WEL item 18	TPB: SN - injunctive
j		I find it hard to resist cake even if I'm not hungry or have just eaten a meal	Adapted from WREQ items 9 & 13 and Three Factor EQ R-18 (TFEQ) [10] item 1.	TPB: PBC – self efficacy
k		If OC is out of view I am less likely to eat some	In response to informal survey	TPB: PCB – barriers. Proximity hypothesis[3]
l		I look forward to office cake.	In response to informal survey	TPB: Attitude: outcome evaluation

Item	Item type	Item text	Source	Purpose/rationale
13a	5-point LS: SA, A, U, D, SD	OC has contributed to an increase in my weight	In response to informal survey and RCS [4]	Explore OC-related weight gain perceptions. TPB: Attitude
b		OC has made it harder for me to control my weight		Explore OC-related weight gain perceptions: TPB Attitude
c		OC makes a weight loss diet harder to stick to		Explore OC-related weight gain perceptions. TPB: Attitude
d		OC has made it harder for me to eat healthily at work		Explore OC-related weight gain and healthy eating perceptions. TPB: Attitude
14	MC: single answer	Who is the most influential person/group of people whose opinions you take into account when deciding whether or not to have a cake?		Explore identity of workplace referents in relation to OC behaviour
15	MC: single answer	In a typical week, how often do you take some sort of action to either avoid OC or counteract the effects of OC? Examples. Never, 1-2, 3-4, 5 or more.	Inspired by WREQ items 1, 7, 10, 12 & 16 and TFEQ item 11	Explore prevalence and nature of counter culture behaviour.
Section 3: Questions about your opinion of office cake culture in general				
16 a	5 point LS: SA, A, U, D, SD	Overall, OC is a good thing.	In response to informal survey	Establish overall opinion on OC.
b		OC is a great way to show appreciation		Identify level of overall positive/negative feelings towards OC culture
c		OC brings people together		
d		OC cheers everyone up		
e		I would support an initiative in my workplace to reduce office cake consumption		Explore level of feeling about changing OC behaviour specifically
f		I would like my workplace to do more to help me be healthy		Explore level of feeling about changing office health environment generally
17	MC: single answer	In your opinion, what is the ideal frequency for OC?		Explore opinion about retaining balance with OC frequency
18	MC: all that apply	Do you think there is a healthier alternative to OC? Examples given.	Drawn from informal survey	
19	Freeform comment– no word limit	I there is anything else you would like to say about the topic of OC please tell us.		Opportunity to gather information not prompted by other questions

Item	Item type	Item text	Source	Purpose/rationale
Section 4: Questions about you				
20	Drop down menu	Please specify your gender.		
21	Drop down menu	What is your age group? 18-29, 30-49, 50+		
22	Drop down menu	Which option best describes your role at work? NB this is related to your level of responsibility, not your job title. (Four options)	Adapted from various assessment centre materials	To enable exploration of potential relationships between job role and cake consumption frequency
23	Drop down menu	To accommodate responses from flexi and part time workers, please select the option below that best describes the proportion of an average working week you work. For example, if you work full time, select 100%; if you work four days a week, select 80%; if you work only mornings, 50%. Please select just one answer. (<40%, 50%, 60%, 80%, 100%)		To allow adjustment part time working for some Section 2 questions (10, 11, 15).
24	Numeric	How tall are you in centimetres?		For body mass index (BMI) calculation
25	Numeric	How much do you weight in kilograms? Please be as accurate as possible. All data is confidential.		For BMI calculation

References

1. Greenwood, J., Lin, J., Arguello, D., Ball, T. & Shaw, J. (2012). Healthy Eating Vital Signs: a new assessment tool for eating behaviours. *Obesity,* 2012, 1-7
2. Greenwood, J., Murtaugh, M., Omura, E., Alder, S. & Stanford J. (2008). Creating a clinical screening questionnaire for eating behaviors associate with overweight and obesity. *Journal of the American Board of Family Medicine*, 21(6).
3. Wansink, B., Painter, J. & Lee, Y-K. (2006). Proximity's influence on estimated and actual candy consumption. *International Journal of Obesity,* 30(5)
4. Royal College of Surgeons. (2016). *Position statement. Combatting cake culture: reducing excessive sugar consumption in the workplace.* Retrieved from http://FDS%20position%20statement%20%20Cake%20Culture%20FINAL.pdf
5. Simmonds, G., Tinati, T., Barker, M. & Bishop, F. (2016). Measuring young women's self-efficacy for healthy eating: initial development and validation of a new questionnaire (8-SeED). *Journal of Health Psychology,* 21(11).
6. Clark, M. M., Abrams, D. B., Niaura, R. S., Eaton, C. A., & Rossi, J. S. (1991). Self-efficacy in weight management. *Journal of Consulting and Clinical Psychology, 59*(5), 739-744. doi:10.1037/0022-006X.59.5.739
7. Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, 50; 179-211

8. Schembre, S., Greene, G., & Melanson, K. (2009). Development and validation of a weight-related eating questionnaire. WREQ. *Eating Behaviors,* 10.
9. Tapper, K. & Pothos, E. (2010). Development of a Food Preoccupation Questionnaire. *Eating Behaviors* (11), 45-53
10. de Lauzon, B., Romon, M., Deschamps, V., Lafay, L., Borys, J., Karlsson, J., … Göteborgs universitet. (2004). The three-factor eating questionnaire-R18 is able to distinguish among different eating patterns in a general population. *The Journal of Nutrition, 134*(9), 2372

Appendix 2

Office Cake Questionnaire

including participant information and consent mechanism

Please note the original online format of the questionnaire has been converted to a PDF file using the Bristol Online Surveys system. This conversion has resulted in minor formatting changes:

1. The 'Key for selection options' on page 18 of the PDF presents the response options for questions 20, 21 and 22. In the original online format these options were presented in drop down menus.

2. The PDF version has created artificial page numbers to correspond with A4 page size.

3. The original online resolution is diminished in the printed version.

University of Chester

Office cake gen

Page 1

Research project exploring the characteristics of 'office cake consumption' and office workers' attitudes towards it

Welcome!

Thank you for your interest this questionnaire. It forms part of a research study that explores office cake consumption in the UK. Before you decide whether to take part by completing the questionnaire, it is important you understand the purpose of the research, how the results will be used and what you will have to do. Please take time to read the following information carefully before deciding whether you want to take part.

The key points are:

- The questionnaire is open to office workers aged 18 or over in England ie people who work mainly in an office environment. Examples of a non-office environment are a factory, laboratory, hospital, school, shop, outside or being on the road, driving.
- Taking part is voluntary. You can discontinue at any time.
- Your name will not be requested or recorded. Your responses are confidential.
- By clicking 'Finish' to submit your answers at the end, you confirm that:

1. You consent to taking part in the research
2. You work in an office
3. Your office is based in England

4. You are aged 18 or over.

- You are welcome to contact the researcher at any time to seek clarification or more information: email Louise Walker at 1523909@chester.ac.uk.

What is the purpose of the research?

'Office cake consumption' is the popular phenomenon whereby cakes and sweet treats are brought into the workplace to share among colleagues. Currently there is no scientific information about the topic. Therefore this study will explore the characteristics of office cake consumption in UK-based offices and office workers' attitudes towards it.

Who can take part in the research?

Anyone who works in an office in the England can choose to take part. Your thoughts and opinions are valuable however you feel about office cake, even if you don't eat it or don't even like it. Participation is welcomed from office workers at any age (18 or over) or level of management.

You cannot take part if either your main workplace is not an office (eg if you work mainly in a laboratory, hospital, classroom, factory, outdoors, on the road, driving etc), if you work outside England or are under 18 years old.

Who is conducting the research?

The research is being conducted by post-graduate student, Louise Walker, as part of her MSc in Obesity & Weight Management at the University of Chester. The project is being supervised by Dr Orla Flannery, Department of Clinical Sciences & Nutrition, University of Chester. It has received approval from the University of Chester Faculty of Medicine, Dentistry & Life Sciences Research Ethics Committee.

You can find further information about the research by clicking here.

Once again, many thanks for your interest in this research.

Page 2: About this questionnaire

The questionnaire is in four sections. Please answer every question in every section. It should take 10 - 15 minutes to complete.

Section 1 asks about cake consumption in your workplace.
Section 2 asks about your own cake consumption.
Section 3 asks about your opinions on workplace cake consumption.
Section 4 asks about you.

You can complete the questionnaire in several stages - you do not have to complete it in one sitting. Simply click 'Finish later' on the page you are working on and your completed answers will be stored until you can resume.

Definition of 'office cake'

Whenever a question asks about 'cake' or 'office cake' it refers to cakes, biscuits, pastries and confectionery that are:

- brought into your workplace by you or colleagues to share among co-workers, or
- brought in on birthdays, or as a regular treat (eg Friday doughnuts), or
- supplied by management or customers as a thank you, or reward, or for any other reason.

'Office cakes' does not include cakes, biscuits, pastries or confectionery you take into the workplace for your own consumption eg as part of a packed lunch or snack.

Definition of 'office'

In this questionnaire, 'your office' refers to your immediate working environment. This could be your team, department, the whole floor, or something different. The research aims to learn about what affects **you personally** so don't worry if what happens in your team, department or floor is different to the rest of the organisation.

Flexi and part time workers

If you work flexi- or part-time, please answer all questions as they are asked. Please do not adjust your answers proportionately. A question at the end asks what proportion of an average week you work and your answer will be taken into account when necessary.

Page 3

Section 1: Questions about cake culture in your workplace

1. In a **typical** working week, on how many occasions are cakes available in your office?

- None
- 1-2
- 3-4
- every day

2. How often is there a regular occasion when there is always cake available your office? Eg doughnuts every Thursday, pastries on the last Friday of the month?

- Once a day
- Once a week
- Once a month
- Never
- Other

2.a. If you selected Other, please specify:

2.b. If this regular occasion has a name eg Doughnut Day, Fat Friday etc, please tell us:

Your answer should be no more than 40 characters long.

3. **Typically**, who are the **main** providers of office cake?

- ○ One person in particular
- ○ A few core people
- ○ We all take it in turns
- ○ Management/supervisors
- ○ A combination of all of the above

4. Which occasions lead to office cake being available in your workplace? *Please select all that apply.*

- ☐ Birthdays/weddings/promotions/retiring/leaving
- ☐ Rewards from management
- ☐ Thank yous from customers
- ☐ Left over from meetings/events
- ☐ TV/charity events eg Great British Bake Off, Macmillan coffee morning, BBC Children in Need
- ☐ We don't need a reason to have cake
- ☐ Other

4.a. If you selected Other, please tell us:

5. Typically in your office, where are office cakes displayed?

- ○ On a desk/table in the main working area/office
- ○ In a separate room
- ○ The provider hands them round
- ○ A combination of the above

6. Are alternatives to cake ever provided? Please select all that apply.

- ☐ No, never
- ☐ Fruit
- ☐ Nuts
- ☐ 'Healthier' treats eg reduced fat/sugar
- ☐ Other

6.a. If you selected Other, please specify:

7. Thinking about your office in a **typical month**, please **estimate** the proportion of office cakes that are **home-made**.

- ○ Hardly any
- ○ About a quarter
- ○ About half
- ○ Most

8. Thinking about your own workplace, please state to what extent you agree or disagree with the following statement. *Please select just one answer.*

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Refreshments for meetings offer enough healthy options.	☐	☐	☐	☐	☐

9. Which of the following 'wellbeing at work' initiatives does your workplace offer? *Please select all that apply.*

- ☐ Reduced-cost or free gym membership or exercise classes
- ☐ Well-publicised healthy food options in the canteen
- ☐ Notices/reminders to take the stairs, not the lifts
- ☐ A fruit bowl in the office or for meeting refreshments
- ☐ Health checks
- ☐ Wellbeing at work sessions/seminars/weeks (eg discussing stress, physical activity, healthy eating)
- ☐ Encouragement to take a proper lunch break
- ☐ Encouragement to go for a walk during the day
- ☐ Standing desks
- ☐ Standing/walking meetings
- ☐ Quiet area/room for relaxing/destressing
- ☐ None that I'm aware of
- ☐ Other

9.a. If you selected Other, please specify:

8 / 18

Page 4

Section 2: Questions about your own office cake consumption

Remember that throughout this questionnaire 'office cake' or 'cake' only includes cakes, pastries, biscuits and confectionery brought into the workplace for colleagues to share. It does not include items you bring in for your own personal consumption.

10. In a **typical** week, on how many occasions do you personally eat office cake?

- ○ None
- ○ 1 - 2 times
- ○ 3 - 4 times
- ○ 5 or more times

11. In a typical week, how often do you turn down office cake when it's offered to you?

- ○ None - I never refuse office cake
- ○ 1 - 3 times a week
- ○ Roughly once per day
- ○ Several times per day (this includes resisting a cake every time you walk past available cakes eg in the kitchen or on a table)

12. Please respond to the following statements to express how often you do, feel or think about these office cake-related situations. *Please select just one answer per statement.*

Please don't select more than 1 answer(s) per row.

Please select at least 12 answer(s).

	Never	Sometimes	About half the time	Often	Always
If there is cake available, I eat it.	☐	☐	☐	☐	☐
I find it easy to refuse a cake if I don't want one or feel I shouldn't have one.	☐	☐	☐	☐	☐
If there is cake in the office I get distracted by the smell, sight or thought of it.	☐	☐	☐	☐	☐
If I've initially refused cake, my colleagues persuade me to change my mind.	☐	☐	☐	☐	☐
I feel regret after eating office cake.	☐	☐	☐	☐	☐
I feel I cause offence or hurt someone's feelings if I turn down the offer of cake.	☐	☐	☐	☐	☐
It's hard to say no to cake if everyone else is eating it.	☐	☐	☐	☐	☐
I feel hurt if someone turns down cake I've brought in to share.	☐	☐	☐	☐	☐

I am made to feel uncomfortable by colleagues when I turn down an offer of cake.	☐	☐	☐	☐	☐
I find it hard to resist cake even if I'm not hungry or have just eaten a meal.	☐	☐	☐	☐	☐
If office cake is out of view (eg in a different room) I am less likely to eat some.	☐	☐	☐	☐	☐
I look forward to office cake.	☐	☐	☐	☐	☐

13. Please state to what extent you agree or disagree with the following statements. *Please select just one answer per statement.*

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Office cake has contributed to an increase in my body weight.	☐	☐	☐	☐	☐
Office cake has made it harder for me to control my weight.	☐	☐	☐	☐	☐
Office cake makes a weight loss diet harder to stick to.	☐	☐	☐	☐	☐

Office cake has made it harder for me to eat healthily at work.	☐	☐	☐	☐	☐

14. Who is the most influential person/group of people whose opinions you take into account when you are deciding whether or not to have a cake?

- ○ Work colleagues
- ○ Family and friends
- ○ GP or other medical professional
- ○ Club or association eg slimming club, personal trainer
- ○ Other

14.a. If you selected Other, please specify:

15. In a typical week, how often do you take some sort of action to either avoid office cake or counteract the effects of office cake? Eg eat a smaller lunch, go for a run, refuse cake but eat something healthier instead eg fruit, find an excuse to leave the office at cake time?

- ○ Never
- ○ 1-2 times/week
- ○ 3-4 times/week
- ○ 5 or more times

15.a. If you do take some sort of action(s) to deal with the effect of office cake, please tell us what action you take. *(If you answered 'never' you do not have to answer this part of the question.)*

Page 5

Section 3: Questions about your opinion of office cake culture in general

16. To what extent do agree/disagree with the following statements? *Please select just one answer per statement.*

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Overall office cake is a good thing.	☐	☐	☐	☐	☐
Office cake is a great way to show appreciation.	☐	☐	☐	☐	☐
Office cake brings people together.	☐	☐	☐	☐	☐
Office cake cheers everyone up.	☐	☐	☐	☐	☐
I would support an initiative in my workplace to reduce office cake consumption.	☐	☐	☐	☐	☐
I would like my workplace to do more to help me be healthy.	☐	☐	☐	☐	☐

17. In your opinion, what is the ideal frequency for office cakes?

○ Never

- ○ Once a month
- ○ Once a fortnight
- ○ Once a week
- ○ Twice a week
- ○ Every day

18. Do you think there is a better alternative to office cake? *Please select all that apply.*

- ☐ Fruit
- ☐ Nuts
- ☐ Cheese
- ☐ Raw vegetables and dips
- ☐ There is no suitable alternative to cake
- ☐ Still have cake, but less often
- ☐ Lower-sugar/lower-fat 'healthier' cakes
- ☐ Other

18.a. If you selected Other, please specify:

19. If there is anything else you would like to say about the topic of office cakes, please tell us:

Page 6

Section 4: Questions about you. This is the last section.

All responses are anonymous and confidential.

20. Please specify your gender:

21. What is your age group?

22. Which option best describes your role at work? NB this is related to your level of responsibility at work, not your job title.

23. To accommodate responses from flexi and part time workers, please select the option below that *best describes* the proportion of an average working week you work. For example, if you work full time, select 100%; if you work four days a week, select 80%; if you work only mornings, 50%. Please select just one answer.

- 100% ie full time
- 80% ie 4 days/wk
- 60% ie 3 days/wk

- 50% ie mornings or afternoons only
- 40% or less ie 2 or fewer days/wk

24. How tall are you in metres? Please enter 1.68 if you are 1m 68cm tall. * *Required*

Please enter a decimal number, for example: 9.63.

25. How much do you weigh in kilograms? Please enter 83.40 if you weigh 83.4kg or 83.00 if you weigh 83kg. Please be as accurate as possible. All data is confidential. * *Required*

Please enter a decimal number, for example: 9.63.

When you click 'Finish' your questionnaire will be submitted. By clicking 'Finish' you confirm:

- **You consent to taking part in the research**
- **You work in an office**
- **Your office is based in England**
- **You are aged 18 or over.**

Page 7: Final page

Thank you very much for taking the time to complete this questionnaire and contributing to this research project.

If you have any queries, please contact the researcher Louise Walker by email at:

1523909@chester.ac.uk

Key for selection options

20 - Please specify your gender:

Male
Female

21 - What is your age group?

18 - 29 years
30 - 49 years
50 years or over

22 - Which option best describes your role at work? NB this is related to your level of responsibility at work, not your job title.

Individual contributor - I am not responsible for a team on a day-to-day basis
Team leader - I have responsibility for a team or group of individuals. This may be a line or project reponsibility
Manager of managers - I am responsible for a team of people who themselves have one or more teams to manage
Director - I have a number of functions reporting to me

Appendix 3: Data from condensed variable analysis

3.1: Responses from condensed Likert scale items 'Never' to 'Often'

Question	Demographic group	Never n (%)	Sometimes/About half the time n (%)	Often/Always n (%)
If OC is available, I eat it	Total Men/Women 18-29/30-49/≥50	76 (8.1)	472 (50.4) (42.1/55.8)[a] (43.0/50.6/55.1)[b]	388 (41.5) (48.9/36.6)[a] (52.3/40.8/35.4)[b]
I find it easy to refuse OC	Total Men/Women 18-29/30-49/≥50	113 (12.1)	349 (37.3)	474 (50.6)
I get distracted by the thought, smell or sight of OC	Total Men/Women 18-29/30-49/≥50	357 (38.1) (44.6/34.0)[a]	370 (39.5) (34.2/43.0)[a]	209 (22.3)
If I refuse OC, colleagues persuade me to change my mind	Total Men/Women 18-29/30-49/≥50	450 (48.1) (57.3/42.1)[a] (40.1/45.4/60.1)[b]	379 (40.5) (32.6/45.6)[a] (43.6/43.5/32.1)[b]	107 (11.4) (16.3/11.2/7.8)[b]
I feel regret after eating OC	Total Men/Women 18-29/30-49/≥50	354 (37.8) (50.5/29.6)[a]	375 (40.1) (35.5/43.1)[a]	207 (22.1) (14.1/27.3)[a]
I feel I cause offense if I refuse OC	Total Men/Women 18-29/30-49/≥50	569 (60.8) (65.2/57.9)[a]	257 (27.5)	110 (11.8)
It's hard to say no if everyone else is eating OC	Total Men/Women 18-29/30-49/≥50	392 (41.9) (51.1/35.9)[a] (36.6/39.8/50.6)[b]	331 (35.4) (29.6/39.1)[a]	213 (22.8) (19.3/25.0)[a] (30.2/22.5/17.3)[b]
I feel hurt if OC I've brought to share is refused	Total Men/Women 18-29/30-49/≥50	673 (71.9) (77.7/68.1)[a] (62.2/73.7/75.3)[b]	179 (19.1) (26.7/18.1/15.6)[b]	84 (9.0) (6.3/10.7)[a]
I am made to feel uncomfortable if I refuse OC	Total Men/Women 18-29/30-49/≥50	734 (78.4) (81.8/76.2)[a]	167 (17.8) (14.4/20.1)[a]	35 (3.7)
I find it hard to resist OC even if not hungry/have just eaten	Total Men/Women 18-29/30-49/≥50	301 (32.2) (37.7/28.7)[a]	370 (39.5) (35.3/42.3)[a]	265 (28.3)
If OC is out of view I am less likely to eat some	Total Men/Women 18-29/30-49/≥50	155 (16.6) (21.7/13.2)[a]	237 (25.3)	544 (58.1) (52.4/61.8)[a]
I look forward to OC	Total Men/Women 18-29/30-49/≥50	188 (20.1) (23.4/18.0)[a] (12.8/17.3/31.7)[b]	430 (45.9) (40.8/49.3)[a]	318 (34.0) (48.8/35.2/20.6)[b]

OC, office cake

[a]: values differ significantly between genders at $p<0.05$

[b]: values differ significantly between age groups at $p<0.05$

'Sometimes' and 'About half the time' were condensed to 'Sometimes/About half the time'; 'Often' and 'Always' were condensed to 'Often/Always'

3.2: Responses from condensed Likert scale items 'Agree' to 'Disagree'

	Demographic groups	Strongly agree/Agree n (%)	Undecided n (%)	Disagree/Strongly disagree n (%)
OC has contributed to increase in my weight	Total Men/women 18-29/20-49/≥50	294 (31.4) (23.4/36.6)[a] (29.7/35.8/23.0)[b]	174 (18.6)	468 (50.0) (57.6/45.1)[a] (49.4/45.4/60.1)[b]
OC has made it harder for me to control my weight	Total Men/women 18-29/20-49/≥50	332 (35.5) (28.5/40.0)[a] (30.8/39.4/30.0)[b]	122 (13.0)	482 (51.5) (59.2/46.5)[a] (56.4/47.3/57.2)[b]
OC makes a weight loss diet harder to stick to	Total Men/women 18-29/20-49/≥50	549 (58.7) (49.5/64.6)[a]	102 (10.9) (14.1/8.8)[a]	285 (30.4) (36.4/26.6)[a]
OC has made it harder for me to eat healthily	Total Men/women 18-29/20-49/≥50	351 (37.5) (31.5/41.4)[a]	135 (14.4)	450 (48.1) (54.9/43.7)[a]
OC is a good thing	Total Men/women 18-29/20-49/≥50	568 (60.7) (70.9/60.8/53.5)[b]	208 (22.1)	160 (17.1) (8.7/17.5/22.2)[b]
OC is great way to show appreciation	Total Men/women 18-29/20-49/≥50	627 (67.0) (82.0/65.4/59.7)[b]	142 (15.2) (9.3/16.0/17.7)[b]	167 (17.8) (8.7/18.7/22.6)[b]
OC brings people together	Total Men/women 18-29/20-49/≥50	755 (80.7)	79 (8.4)	102 (10.9) (5.2/11.3/14.4)[b]
OC cheers everyone up	Total Men/women 18-29/20-49/≥50	774 (82.7)	95 (10.1)	67 (7.2)
I would support an initiative to reduce OC consumption	Total Men/women 18-29/20-49/≥50	337 (36.0) (31.5/38.9)[a]	277 (29.6)	322 (34.4) (41.3/29.9)[a]
I would like my work-place to do more to help my health	Total Men/women 18-29/20-49/≥50	486 (51.9) (46.2/55.6)[a] (54.7/54.4/44.9)[b]	195 (20.8)	255 (27.2) (31.0/24.8)[a] (20.3/26.2/34.6)[b]

OC, office cake

[a]: values differ significantly between genders at p<0.05

[b]: values differ significantly between age groups at p<0.05

'Strongly agree' and 'Agree' were condensed to 'Strongly agree/Agree'; 'Disagree' and 'Strongly disagree' were condensed to 'Disagree/Strongly disagree'

3.3: Reponses to item 11: number of office cake refusals in a typical week

	Demographic group	Never n (%)	1-3 times/week n (%)	Once/day n (%)	Several times/day n (%)
In a typical week, how often do you turn down office cake when it's offered to you?	Total Men/Women 18-29/30-49/≥50	339 (36.1) (44.6/30.5)[a]	426 (45.3) (38.4/44.6/51.4)[b]	58 (6.2) (3.3/8.1)[a]	117 (12.4)
				Condensed data	
	Total Men/Women 18-29/30-49/≥50	339 (36.1) 44.6/30.5)[a] (43.0/35.8/31.7)[b]	426 (45.3) (38.4/44.6/51.4)[b]	175 (18.6) (13.6/22.0)[a]	

[a]: values differ significantly between genders at p<0.05

[b]: values differ significantly between age groups at p<0.05

'Once/day' and 'several times/day' were condensed to 'at least once per week'

Appendix 4

FREC approval

Faculty of Medicine, Dentistry and Life Sciences
Research Ethics Committee

frec@chester.ac.uk

Wednesday, 22 March 2017

Louise Walker
80 Swarraton
Alresford Hampshire
SO24 9TQ

Dear Louise,

Study title: Office cake consumption in the UK: an exploration of its characteristics and associated attitudes among UK-based office workers.
FREC reference: 1241/17/LW/CSN
Version number*:* 2

Thank you for sending your application to the Faculty of Medicine, Dentistry and Life Sciences Research Ethics Committee for review.

I am pleased to confirm ethical approval for the above research, provided that you comply with the conditions set out in the attached document, and adhere to the processes described in your application form and supporting documentation.

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Application Form	1	Feb 2017
Appendix 1 – Summary CV for Lead Researcher	1	Feb 2017
Appendix 2 – List of references	1	Feb 2017
Appendix 3, 4, 6 & 7 – Letters of invitation to participants	1	Feb 2017
Appendix 5 – Written permission(s) from relevant personnel	1	Feb 2017
Appendix 8 – Recruitment through social media form	2	Mar 2017
Appendix 9 – Participant information sheet (PIS)	2	Mar 2017
Appendix 10 – Non-validated questionnaire(s)	1	Feb 2017
Appendix 11 – Questionnaire: sources and rationale	1	Feb 2017
Appendix 12 – Email for participating organisation coordinator to prompt final responses	1	Feb 2017

Appendix 13 – Email thanking organisations for taking part, post-survey	1	Feb 2017
Appendix 14 – Risk assessment	1	Feb 2017
Appendix 15 – Research & Knowledge Transfer Office approval	1	Mar 2017
Response to FREC request for further information or clarification	1	Mar 2017

Please note that this approval is given in accordance with the requirements of English law only. For research taking place wholly or partly within other jurisdictions (including Wales, Scotland and Northern Ireland), you should seek further advice from the Committee Chair / Secretary or the Research and Knowledge Transfer Office and may need additional approval from the appropriate agencies in the country (or countries) in which the research will take place.

With the Committee's best wishes for the success of this project.

Yours sincerely,

Professor Ben Green
Chair, Faculty Research Ethics Committee

Enclosures: Standard conditions of approval.

Cc. Supervisor/FREC Representative

Appendix 5

Letters of support from potential participating organisations

5.1: Public Health Teams, West Berkshire Council & Reading Borough Council; Bracknell Forest Council

n= 2000-3000

Mon 23/01/2017 09:39
Jo Jefferies <Jo.Jefferies@bracknell-forest.gov.uk>
Re: Participation in an MSc research project into office cake culture (Project subject to approval by University of Chester Faculty of Medicine, Dentistry & Clinical Sciences Research Ethics Commi

o LOUISE WALKER

You replied to this message on 23/01/2017 10:10.
If there are problems with how this message is displayed, click here to view it in a web browser.

Dear Lou,
I can confirm that public health teams in West Berkshire Council and Reading Borough Council would like to disseminate an invitation to participate in this research project to all staff.
I will also promote in Bracknell Forest Council.

Any information you can share to promote the project would be great to support the invites.

I need to get more info on staff numbers as many Council staff won't be office based so won't be eligible.

BW
Jo

Jo Jefferies
Consultant for Health Protection
Public Health Services for Berkshire
Adult Social Care Health & Housing
Bracknell Forest Council
Time Square
Market Street
Bracknell
RG12 1JD

5.2 Breast Cancer Care

n=250

Thu 19/01/2017 12:50
David Crosby <David.Crosby@breastcancercare.org.uk>
RE: Participation in an MSc research project into office cake culture (Project subject to approval by University of Chester Faculty of Medicine, Dentistry & Clinical Sciences Research Ethics Committee)

To LOUISE WALKER
Cc Linda Kelly

You replied to this message on 19/01/2017 13:15.

Action Items + Get m

Hi Lou, just to confirm that Breast Cancer Care is happy to support your research by circulating a link to your survey to our employees. Please can you liaise with our Assistant Director of HR, Linda Kelly, with regard t this at the appropriate time. I've cc'd Linda into this response.

Kind regards.

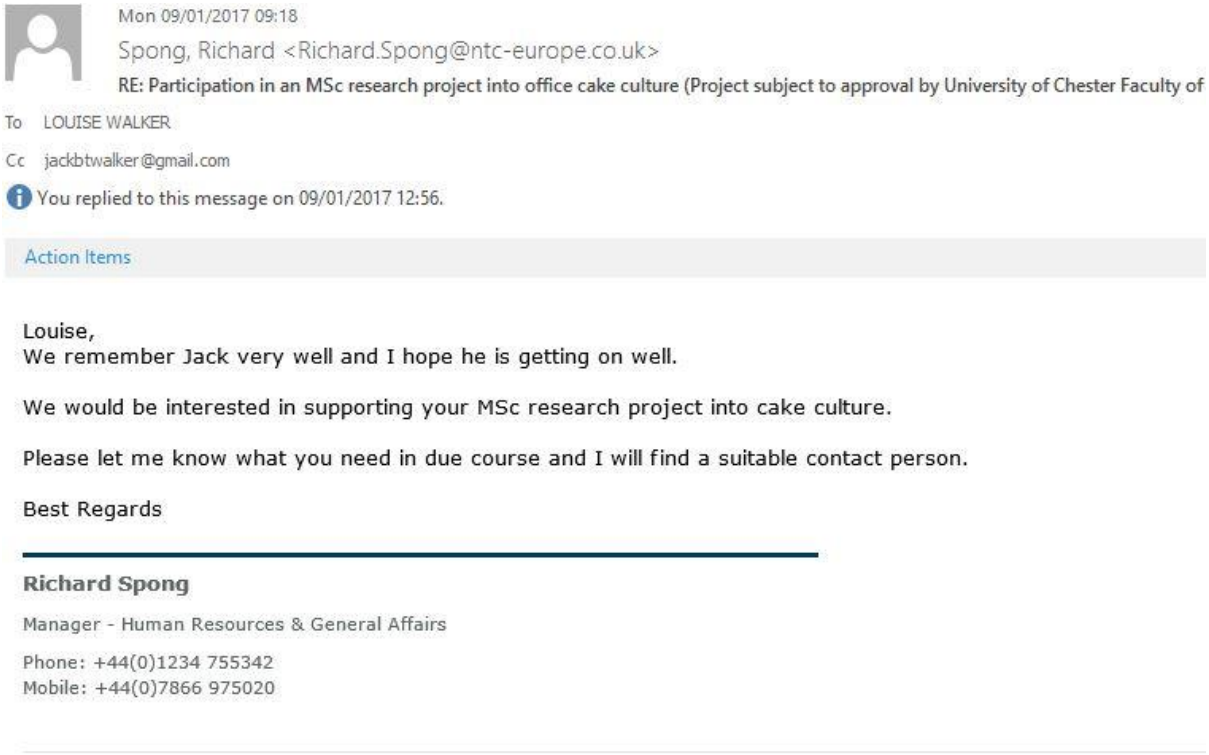
David Crosby
Director of Services and Engagement

Breast Cancer Care
Kennington Business Park, Chester House, 1-3 Brixton Road, London SW9 6DE
Direct line: 020 7960 3429 Switchboard: 020 7960 3400
Mobile: 07913 055182
E-mail: david.crosby@breastcancercare.org.uk
Twitter: @DavidJCrosby

Secondary. Not second rate.
When time is uncertain, women with secondary breast cancer need to be certain of your support.
Act today to improve care

5.3 Nissan Technology Centre – Europe

n = 800



Mon 09/01/2017 09:18

Spong, Richard <Richard.Spong@ntc-europe.co.uk>

RE: Participation in an MSc research project into office cake culture (Project subject to approval by University of Chester Faculty of

To LOUISE WALKER

Cc jackbtwalker@gmail.com

You replied to this message on 09/01/2017 12:56.

Action Items

Louise,
We remember Jack very well and I hope he is getting on well.

We would be interested in supporting your MSc research project into cake culture.

Please let me know what you need in due course and I will find a suitable contact person.

Best Regards

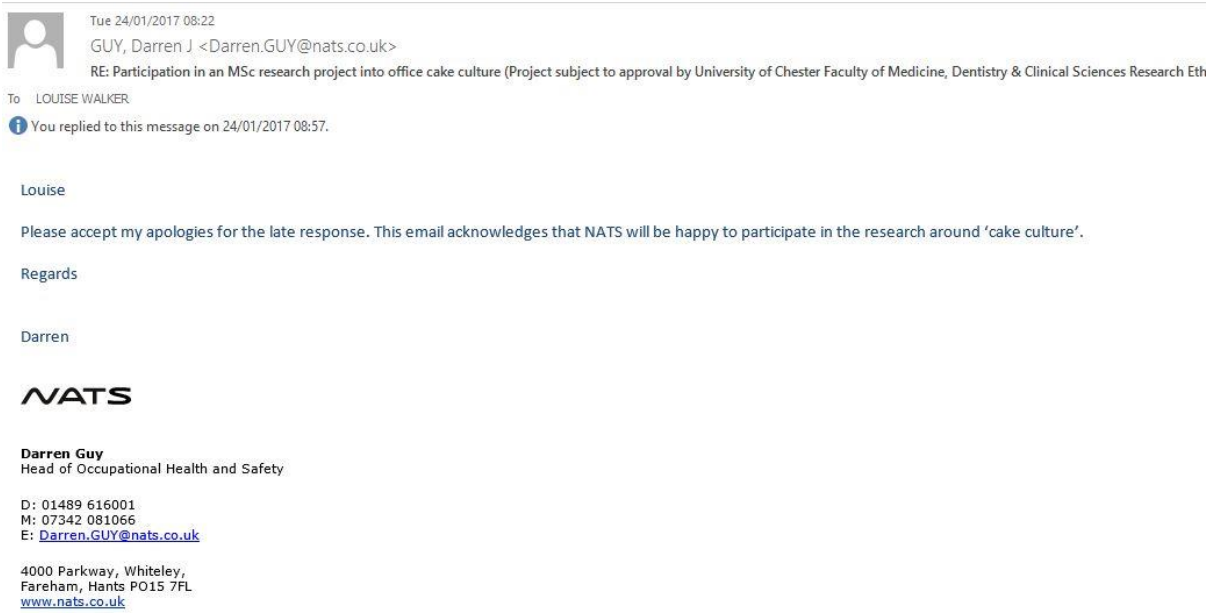
Richard Spong

Manager - Human Resources & General Affairs

Phone: +44(0)1234 755342
Mobile: +44(0)7866 975020

5.4 NATS, Whiteley

n = 1000



Tue 24/01/2017 08:22

GUY, Darren J <Darren.GUY@nats.co.uk>

RE: Participation in an MSc research project into office cake culture (Project subject to approval by University of Chester Faculty of Medicine, Dentistry & Clinical Sciences Research Eth

To LOUISE WALKER

You replied to this message on 24/01/2017 08:57.

Louise

Please accept my apologies for the late response. This email acknowledges that NATS will be happy to participate in the research around 'cake culture'.

Regards

Darren

NATS

Darren Guy
Head of Occupational Health and Safety

D: 01489 616001
M: 07342 081066
E: Darren.GUY@nats.co.uk

4000 Parkway, Whiteley,
Fareham, Hants PO15 7FL
www.nats.co.uk